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ROYAL ASIATIC SOCIETY

[No. 45]

JOURNAL

June, 1906

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Annual Report for the year 1905.

The Committee have again to report that the affairs of the Society are financially in a satisfactory condition.

During the year three numbers of the Journal have been published Nos. 42, 43, 44 and two others are at present being printed. The supply of interesting material for the Journal has increased considerably during the last year as has the number of contributors. Some important Malay manuscripts have been obtained by Mr. Maxwell, and Mr. Laidlaw has been assiduously collecting Folk-lore tales of Malaya. Mr. Shelford's illustrated catalogue of Dyak personal ornaments formed volume 43 of the Journal. We have additional Folk tales of Borneo from Mr. Gomes, and papers on Malay lace making and basket making by Mrs. Bland, on the Perak Sakais by Mr. Cerruti, and other Ethnographical papers are being printed, Natural History papers have been furnished by Mr. Shelford, Cameron, Kloss, Hewitt, Robinson and Ridley. Illustrations from photographs supplied by the authors have been prepared by the firm of Carl Henschel and are a great improvement to the Journal. One of the old numbers (No. 25) being quite out of print was reprinted.

During the year His Excellency Sir John Anderson kindly consented to become Patron of the Society and the following new members were elected.

Mrs. Bland
W. S. O. Richards
R. D. Acton
G. E. V. Thomas
J. B. Carruthers
R. S. Douglas
He. P. Gueritz
J. Hewitt
B. Nunn
Dr. John Donald
Mr. J. W. Campbell
R. E. Hose.

It was not possible to make any headway with the new edition of the map this year but the whole of the old edition is now sold out and it is hoped that in the ensuing year substantial progress may be made towards bringing out a new edition.

HONORARY TREASURER'S ACCOUNT FOR THE YEAR 1905.

	$	c.	$	c.
Balances brought forward from 1904:—				
Mercantile Bank, Fixed Deposit	2700	..		
Chartered Bank, Fixed Deposit	2300	...		
Mercantile Bank, Current Account	753	80		
Chartered Bank, Current Account	25	79	5779	59
Receipts in 1905:—				
Subscriptions for 1902 ...	5	...		
,, ,, 1903 ...	15	...		
,, ,, 1904 ...	90	...		
,, ,, 1905 ...	470	...		
,, ,, 1906 ...	5	...		
Life Membership ...	50	...		
Sale of Journals ..	204	...		
Sale of Maps	679	27		
Sundry Recoveries ...	2	..		
Bank Interest ..	200	...	1720	27
			7499	86

	$	c.	$	c.
Payments in 1905:—				
American Mission Press .	1266	50		
Plates	349	49		
Bookbinder	55	...		
Copying Malay Manuscript	30	...		
Special Clerical Assistance	70	...		
Clerk's Salary ...	60	...		
Peon's Salary	24	...		
Carpenter	21	50		
Postages, Freights and Petties	108	10		
Cheque Book	1	50	1986	09
Balances carried forward:—				
Mercantile Bank, Fixed Deposit	2700	...		
Chartered Bank, Fixed Deposit	2300	...		
Mercantile Bank, Current Account	318	41		
Chartered Bank, Current Account	195	36	5513	77
			7499	86

Audited and found correct

C. Boden Kloss.

R. Hanitsch,

Honorary Treasurer, Straits Branch Royal Asiatic Society.

Mantra Gajah.

By W. George Maxwell.

"The book of mantras* used in connexion with elephants; "taken from the mantras of Tunku Mantri Ibrahim bin Jaffar, "which are in the possession of Che Pandak Abdullah and "committed to writing by Toh Sarif Aman; mantras which "have come down from the Datohs Sri Adika Raja of Ulu "Perak, Toh Kalaung and Toh Kalalang, to Toh Muda Abdul-"rauf and from him to the present day."

With these words ends a small Malay manuscript in my possession of which I have made the translation that follows.

Of the persons mentioned I have not been able to discover much that throws any light on the original source of the mantras. Tunku Mantri Ibrahim is the well-known Mantri of Larut, who was banished to the Seychelles after the Perak War and who, in the days of his greatness, owned a large number of elephants. The present Tunku Mantri Muhammad Isa, the Magistrate in charge of Selama, is his son. Orang Kaya Kaya Sri Adika Raja is the title of the principal chief of the district lying in the upper reaches of the Perak river on the northern boundary between the Malay States under Siamese protection and Perak.

To the present Datoh Sri Adika Raja, Wan Muhammad Salleh, I.S.O., I am indebted for much assistance in the enquiries which I have made regarding these mantras.

The first glance at the mantras shows that, while a few are purely Malay, the majority of them are in a language which is not Malay, and that some are partly in one language and partly in the other. The two languages appear even to have been mixed, or fused, for in some of the mantras which would appear to be non-Malay a great proportion of the words have Malay meanings. Of this, section nineteen contains an example. But this, as will be suggested below, is most probably only the result of the corruption of the sound of non-Malay words in the mouth of a Malay. In order to emphasize the difference between the non-Malay and the Malay words, the former are printed in capitals, and the latter in italics. [In the manuscript, which is in the Malay character, the writer has made use of the Arabic vowel marks in writing the non-Malay words.] Where there are any signs of corruption I have, wherever I have considered it useful, given the meaning of the Malay words. Each of the purely Malay mantras is followed by a translation.

---

* The Malays have borrowed the Sanskrit word mantra, which denotes a charm or magical formula. I must apologise for its constant use in this article, but it is a word which cannot be adequately translated.

A perusal of this collection of mantras shows that not only is there a mixture of languages but that there is an extraordinary jumble of religions. Rama appears both in the Malay and the non-Malay mantras and is generally placed in antithesis to the Great Sages either of Hinduism or of Buddhism. The purely Malay mantras, which are only three in number, and confined to sections 4 and 5, are of general import only, with no particular reference to elephants. Of these mantras the second begins with Bi'smi-'llahi'r-rahmani'r-rahimi and the third ends with la-ilaha illa-llahMuhammad rasul Allah.

The Azazil, who is described in the first Malay mantra as a "headman of the forests," is perhaps the Azazel of the sixteenth chapter of Leviticus, who is supposed to have been either a pre-Mosaic Devil or else a spirit of the deserts and wildernesses.*

---

* "The scapegoat" is the translation of the Revised Version of the Bible, but a marginal note states that the Hebrew word is Azazel. Substituting the word Azazel for the word scapegoat the passage is as follows.

"And Aaron shall cast lots upon the two goats, one lot for the "Lord and the other for Azazel. And Aaron shall bring the goat "upon which the Lord's lot fell, and offer him for a sin offering. But "the goat upon which the lot fell for Azazel shall be presented alive

"The Samil of the first mantra is probably Samhail, of "whom D' Herbelot has the following account:

"SAMHAIL, nom d'un Ange qui gouverne le sixième ciel, "selon les rêveries des Musulmans.

The last mantra calls on Betara Guru and Betara Kala who are identified with Vishnu and Shiva respectively * (The derivation of Betara being the Sanskrit avatara "descent," according to Crawfurd, or according to Favre the Sanskrit battara, "respectable" §)

In so short a space it would be difficult to find more variety and confusion.

All the elephant owners and elephant drivers to whom I have spoken in Perak on the subject of the non-Malay mantras were more or less—as they knew more or less of the *elmu gajah*—"the science of elephants"—familiar with the words of the mantras and with the medicines prescribed in the book, and one of them who was extremely interested in my enquiries into the *asal elmu*—"the source of the science,"—has recently presented me with another manuscript containing similar mantras.

All my informants admitted their entire ignorance of the meaning of the non-Malay words, and not one of them made the slightest attempt to suggest any interpretation—They all agreed however in ascribing a Siamese origin to the mantras,

---

"before the Lord to make atonement with him, and to let him go to "Azazel in the wilderness"

D'Herbelot gives a different account of Azazel in his Bibliothèque Orientale. He writes as follows:

"AZAZIL, anges qui sont les plus proches du trône de Dieu. "On les joint ordinairement avee les *Afrasils* qui sont les *Seraphins*, "et avec les Kerubiin ou Chérubins. Saadi fait mention des Azazil "dans la préface de son Bostan: cependant il les comprend tous "collectivement sons un nom singulier; car il dit que lorsque Dieu "distribue ses graces, Azazil dit, avec une profonde humilité: c'est "de vous seul, Seigneur, que tout notre bonheur dépend."

* Crawfurd Malay Grammar p. cxcviii, and Skeat Malay Magic p. 85.

§ Favre Dictionary II p. 255.

and they unanimously attributed the whole of their knowledge of the capture, training and treatment of elephants to the Siamese.

That the Malays are correct in admitting their indebtedness to the Siamese for their knowledge of elephants is not however admitted by some authorities.

Crawfurd was of opinion that the Malays obtained their knowledge from India. He writes "the popular name for the "elephant everywhere is the Sanskrit one, gajah * but as the "animal is a denizen of the forests of the Peninsula and Sumatra, "the probability is that this has arisen from the Hindus having "instructed the natives in the art of taming it, a supposition "corroborated by the fact that *all the gear and trappings of the* "*elephant with the name of the conductor are also Sanskrit.*" †

In Maxwell's Manual of the Malay language, the rash concluding statement is considerably modified as follows.

"The elephant is most generally known over the Archipe-"lago by its Sanskrit name *gajah.* Sanskrit terms are also "used to signify the driver of an elephant and several articles "used in connexion with the animal."

The following list‡ is given.

English	*Malay*	*Sanskrit.*
Elephant	Gajah	gaja.
Elephant driver	Gambala	gopala (herdsman).
Goad	Kosa	ankuça.
Foot chain	anduwan	andu (chain).
Front part of the head	Gomba	Kumbha.
Unbroken, vicious, *musth*	meta	mada.
Hobbles	sengkela	çrinkhala (chain).

---

* *Biram* is used in many hikaiats instead of *gajah*. Its derivation is not given in any Malay dictionary in my possession.

† Crawfurd Malay Grammar p. clxxviii. The italics are mine.

‡ Another word might be added. *Mengkuna*, the Malay word for a tuskless male is obviously the Indian word *Muckna*.

"From these circumstances we may probably conclude, "with Crawfurd, that the art of training and domesticating elephants was first learned by the Malays from natives of India. "The words of command used by elephant-drivers in the Malay "Peninsula appear, however, to be adapted mainly from the Siamese, and it is from this people that the Malays of the continent "have acquired much of their modern knowledge of the art of "capturing, subduing and training the elephant."*

With all the deference that is due to these two authorities, I suggest that the truth is possibly contained in a legend which is preserved in the thirteenth *cherita* of the *Sejarah Malayu.* The story is as follows. "The headman in charge of the elephants of Sultan Mansur, King of Malacca, was Sri Rama, a "Kshatriya by birth (*asalnia shatria*). [Incidentally we are told "that he was a drinker (*peminum*), and that always, when he "presented himself before the (Muhammadan) King, arrack was "given him to drink]. One day Kanchanchi, the elephant that "the king himself always mounted, escaped into the forest, and "all Sri Rama's efforts to retake it were unavailing. Then Sri "Rama said "there are, too, people in this country, who know "(about elephants)" (*ada juga orang yang tahu didalam negri* "*ini*),† and he reported the whole matter to the king. Thereupon the king ordered enquiries to be made through Malacca "to discover if by chance there was any one who knew the "science of elephants (*elmu gajah*). Now at this time the king "of Malacca had as prisoner Maharaja Dewa Sura, the king of "Pahang, a country abounding in elephants, and it was reported "to the king of Malacca that Maharaja Dewa Sura was deeply "versed in the science of elephants (*terlalu tahu elmu gajah*). A "message was sent to Maharaja Dewa Sura who undertook to "recapture the elephant on the condition that he was set free "from the prison in which he was confined. He was accordingly

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* Maxwell. Manual of the Malay Language, p. 18.

† With all due deference, I submit that Dr. Leyden by translating these words in the Malay Annals as "there are people who are acquainted with the interior of this country" has missed the whole point of the story :—

"released, and forthwith caught the elephant. Thereafter the "king of Malacca ordered all the young men at his court to learn "the science from Maharaja Dewa Sura; for it was the king's "custom, whenever any person was very skilful regarding elephants or horses or in the use of weapons, to have the youth of "his court taught by that person at the king's own personal "expense."

The salient points in the story are that the headman of a Malay king's elephants was a Hindu of the warrior caste (who, at the present day, would perhaps have been known as Ramasami); that he was aware of the existence in the country of a knowledge of the art of catching elephants, whereas apparently the Malay king was not aware of it; that in the king of a country on the east coast of the peninsula, far removed from the influence of India or Sumatra, was found a skilful exponent of the art; and finally that his art differed from that of the Hindu.

It is suggested that it is possible that the deductions which may be made from a purely legendary story may have some foundation in fact; that is to say, that, when the invasion of the Peninsula from Sumatra took place, the invading Malays brought with them a knowledge of the training of elephants derived from India, but that at the time of the invasion the inhabitants (whoever they may have been) had already a knowledge of the management of elephants.

My efforts to discover any Malay tradition regarding the early history of the art of elephant training were not successful. In answer to my questions, my Malay elephant driver friends were able to state regarding these mantras very little more than they were *katurunan deripada siam* "descended from Siam." For as many generations as they could count they were convinced that the mantras had been in the hands of their Malay ancestors. They knew no tradition of *siam* elephant catchers or elephant trainers being in the country. They had no idea why the *siam* came into the country nor why they imparted their knowledge to the Malays. How, why or when they acquired their present knowledge they could not say, but of one thing they were certain and that was that it was *katurunan deripada siam.*

It is well known that the Malays have the same tradition regarding the old mining shafts that are to be found in various localities throughout the Peninsula. Everywhere they are called *lumbong siam.* "Siamese mines." In the gold area of Ulu Pahang I have even heard the word used as a verb with reference to land that had been so extensively pitted as to be practically worthless. *Tanah itu sudah siam* a Malay will say, meaning that the land has been worked out by a long-past generation of "Siamese".

It is, I believe, a generally accepted theory among scientists that these shafts are not really Siamese, but are the work either of the Indonesian race whose tools were the *batu lintar*, or else of the Mon-Khmer race who populated the southern part of Indo-China before the invasion of the Lao, or Thai, from the north. (As members of the society will remember, the affinity of the Mon-Khmer language with the dialects of the "aboriginal" tribes of the Malay Peninsula was pointed out by J. R. Logan[*] and elaborated by C. O. Blagden [§]) I was therefore anxious to learn whether the Malays ascribed the mantras and the mining shafts to the same period or to the same race of *orang siam.* But this connexion of ideas appeared to be new to them, and they could say nothing more definite than "perhaps."

An examination of the mantras shows that they consist of more or less corrupt Siamese words, the uncouth sounds of the words probably having been considerably altered in the mouths of the Malays during the generations that the mantras have been in use. It is probable that though the mantras are now preserved in manuscripts their commitment to writing is only of recent date. For instance, the manuscript now translated is only twenty-six years old, and there is nothing to show whether it is a copy of an older manuscript or a collection of mantras committed to writing for the first time. Of what Colonel Yule termed Hobson Jobson words we probably have two excellent examples in sections 9 and 10. *Si Kambing Hutan* means in Malay "the goat-antelope of the forest" (the serow, naemorhaedus sumatranus). *Kumbang* is the generic Malay term for a beetle, and no particular species is known, so far as I am aware, as *Si Kumbang Hutan*, the forest beetle. And neither goat-antelope nor beetle can have any possible connexion with either mantra.

---

[*] Journal of the Indian Archipelago vol. IV. p. 345.

[†] J. S. B. R. A. S. No. 27 p. 21.

A Siamese to whom I read over the mantras recognized the Siamese sounds and words in them, but every now and then a mantra or part of it would puzzle him and after trying various sounds and tones he would say that that is was not Siamese.

If this is really the case, the question is whether the words are merely so corrupt as to be unintelligible, or whether they are in another language.

The text shows that the principal object of the mantras is to avert misfortune: they are defensive rather than aggressive. The terms used to denote the various kinds and degrees of misfortune require a word or two of comment. The general term is *pilak*, which, though it is not to be found in Malay dictionaries, is a fairly common, and, I believe, a purely Malay word.

Bahdi, *genaling* and *jinggi* are practically synonymous terms for evil influences which the Malays believe to be brought into play by the death or capture of a wild animal. (An account of the Malay ideas on this subject, with a collection of mantras and a description of the driving out of the *bahdi* will be found in an article by the present writer in Blackwood's Magazine for October 1903). For *bahdi* a Sanskrit origin from *vadha*, killing, has been claimed.*

Genaling, though now a Malay word in ordinary use, appears, with an antithetical form *gunaling* in the non-Malay mantras, and has perhaps a non-Malay origin. If its origin is Siamese, it must have become somewhat corrupted as there is no "g" in Siamese.

Rengab, a word which appears frequently in the mantras and in the text, where the compound from *pe-rengab* is more common, and which is used by Malay *pawangs* to denote a charm which extinquishes an enemy's power of inflicting an injury, is the Siamese word ra-ngab, an antidote.

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* Maxwell. Manual of the Malay language p. 34.

Chang is the Siamese for an elephant and the meaning of the frequent expression *Om rengab maha rengab chang rengab* is therefore obvious.

Chengrai which also appears both in the text and in the mantras is used in Malay to mean any mishap or mischance, (with a curious special application to the rite of circumcision) is the Siamese word chang-rai, ill fortune or ill omen. (Both *rengab* and *chengrai* will be found in Wilkinson's Malay dictionary as Malay words.)

Chemahang is described in section 83 of the mantras as being in a language that is not Malay, and it is translated for the benefit of the reader. (*Chemahang arti-nia bhasa malayu kena pilak gajah atau kena pilak kayu atau kena chengrai atau kena bahdi yang besar*). I cannot find the word in my Siamese dictionary, but suggest that the Malay word *jembalang*, an evil influence, is a corruption of it or connected with it.

The first thing that is desired is a translation of the non-Malay mantras. It is not within my power to attempt such a translation. All that I have been able to do is to provide a literal translation of the Malay text and Malay mantras. Apart from the translation of the non-Malay mantras, we are confronted by many questions which demand answers.

Are similar mantras in use among the Siamese?

Do these mantras contain any element that is not Siamese?

If so, what is it, and is it possible that the Siamese lore is superimposed upon an older system?

Apart from the mantras, an examination and comparison of the Malay and Siamese systems of elephant catching and training may assist us in our enquiry, and for this purpose I have given in an appendix a brief account of the Malay system with a list of some of the technical terms used in connexion with the training-stocks and a list of the words of command. The first list was compiled by me in Perak and the second is copied from the one supplied by my father in the second number of the Notes and Queries of this society. It will be seen that the words of commend used in Perak differ from those in Kedah, and that they certainly are not Malay words.

Lastly, is these any similarity between the Malay and the Siamese system of the medical treatment of elephants? In an appendix I give a list of the plants mentioned in the Malay text, and Mr. H. N. Ridley has been kind enough to supply their scientific names with a brief description.

It will be noticed that many of the remedies are symbolical. The use of three or five limes, that grow on a single stem, mixed with the love grass, that clings to every thing, is given in section 47 as a devise to make a wild male elephant remain with a herd of females. The medicine to prevent an elephant from swinging its tail is the rubbish that collects round posts that stand in a stream and shake to and fro with the force of the current. (section 57). To make an elephant return to its master's house of its own accord from the forest the remedy is to take the cooking place, ladder and threshold beam of an abandoned house and to give fragments of them to the elephant with its food (section 80). To make an elephant fat one remedy must be given during the full moon and while the elephant is standing in water above the swelling of its belly, and another remedy must be given when the moon is rising. (section 78).

The remedies include such extraordinary articles of diet for a herbivorous animal, as rhinoceros' navel (section 78), fish (78) prawns (75) and oxhide.

The use of arrack (section 62) is hardly orthodox perhaps among Muhammadans even as a medicament for an elephant, but the prescription in section 83 of water from a pig's wallow is most extraordinary, for it would be difficult to imagine anything more abhorrent to the average Malay.

Many of the plants mentioned such as *kunyit trus*, *lengkuas*, *jenjuang*, *galenggang*, *gandarusa*, from part of the ordinary pharmacopeia of the Malays, but it will be interesting to know to what extent the remedies have been borrowed from, or are common to, Siam.

A LITERAL TRANSLATION OF THE MANTRA GAJAH.

(Note. In the mantras Malay words are printed in Italics, Non-Malay words in Capitals).

This is written to set forth the mantras used in connexion with elephants. If we intend to build an enclosure in which to catch elephants, or if we wish to look for a suitable site for such an enclosure, or to select the best place for the gate of the enclosure, or if we desire to snare an elephant either when confined in the enclosure or at large in the great forest, in all these cases it is necesssary that we should know the teaching of learned men and the auguries and signs, and then perchance God Almighty may grant a safe and prosperous issue to our undertaking.

1. If, when we inspect the proposed site for an elephant enclosure, we find many ant-hills in it or much earth that has been undermined by ants, that place is not a suitable one and much sickness will result if it is used. If there are two trees growing there so close together as to resemble stocks, or if two trees grow there interlocked, or if dead stump is there, the place is not a good one. It is not a good place if in it there are roots or jungle creepers twisted into inextricable knots, whether it be on the ground or above it. And it is a bad place if there is in it a hard wood tree of which part is dead and part alive.

2. This deals with the selection of the site for the gate of the enclosure. If there are jungle creepers growing one on top of the other the place is not good, nor is it good if a white ants' hill or any large ant-hill is found in front of the gate or within the enclosure. It is not good if there is low lying flat ground in front of the gate or within the enclosure. If in front of the gate two branches of trees have joined and grown together or if the gate is overhung by interwoven creepers, the place is not good one for the purpose.

3. This deals with the lore in connexion with cutting the wood for the post of the gate to the enclosure. When the first chip falls from the axe to the ground we look carefully to see whether the bark his uppermost or not. If it fall with the bark

underneath the wood will not do for the gate post, but if the bark be uppermost the wood is well suited.

4. Now when we burn the candle in front of the smaller enclosure to learn the augury whether the elephants will be early or late to enter the enclosure we should look at the wick of the candle : if the wick bends in our direction, that is a sign of the guarantee of the success of our enterprise, and if it bends away from us it is a sign to the contrary. If the wick bends to the right it is a sign that we should take the task in hand further to the right, whether our intention be to make an elephant enclosure, to select a clearing for hill padi or to build a house. If the wick bends to the left, we should go to the left. But if the wick bends over in a ring so that the end meets the stem, we must not utilize the ground for any purpose ; nor is it good if the wick burns with a double flame like the twin gravestones over a tomb. Nor is it good if the wick in burning becomes twisted. But if the wick burns upright and the flame rises straight, then the place is good one both for an elephant enclosure and for a dwelling place : and by the blessing of God our enterprise will be protected. And we shall obtain an advantage and freedom from danger if we repeat this charm when we light the candle.

> ‘HEI JEI SIK PAK KALAK JEISAK PREI SHARAPAN CHANGRAI SAHA MAIHIN KAKA NILU AH AH AH.’

or we may use this charm.

As-salam aleikom
Hei sri chahia.
Janganlah angkau berdusta.
Dan janganlah berbuat bohong kapada ku.
Akulah bersipat dengan sipat tuan.
Angkau bersipat dengan sipat hamba.
Tunjuklah alamat yang sabenarnia kapada ku.
Aku jadi deripada nur Allah
Angkau jadi deripada thelmak Allah
Aku menanggong amanat Allah
Angkau menanggong khianat Allah
Akulah bersipat hu berkat Ilaallahu

[Hail ! bright and gracious one ! Do not be untrue to me, and do not make a lie to me. I stand here as master, you as slave. Show me a true sign. From the brilliancy of God is my creation, yours is from the darkness of God. I am supported by the protection of God, you have abused the confidence of God. I have the attribute of the blessed saying "Allah is God."]

5. This deals with the opening up of forest that has never before been put to any use by man. It may be that we intend to make an elephant enclosure, or to dig a ditch, or to cut a water course for a mine, or to dig a hole for the posts of a house, or to dig a hole for the gate posts of an elephant enclosure, or to put up its fence : in all these and similar cases we must avail ourselves of all the auguries and lore in connexion with the matter and then perchance the blessing of God may attend our enterprise and give it a successful issue.

We first apply to the *penghulus* [headmen] who hold sway over the forest, and this is our petition.

Bi'smi-'llahi'r-rahmani'r-rahimi.
Hei Azazil dan Samil Akbar.
Angkau hukomkan seklian anak chuchu chichit mu.
Jangan angkau bri mengaru-ngaru menyakiti MARANA JANAI *aku,*
Dan anak buah aku,
Dan anak istri-ku,
Dan rumah tangga-ku,
Dan segala tanaman-ku,
Dan segala kahidopan-ku,
Dan segala kerja buat-ku,
Dan segala kampong laman-ku
Aku berdiri dengan firman Allah Takla.
Aku berkata kahandak Allah Taala.
Berkat ya hu hak.

[In the name of Allah the merciful and compassionate. Oh Azazil and Samil Akbar do ye order all your children, grand children and great grand children not to interfere with me nor to bring sickness upon me, nor upon my children, my family and my household, nor upon any living animal of mine, anything that I have planted nor any work of my hands, nor upon anything within my yard or ground. I stand here with the command of Allah Taala, I speak the will of Allah Taala. By the blessing of YA HU HAK.]

And when we have said the above we say the following words.

Hei Betara Guru, Betara Kala.
Angkau hukomkan segala raiat mu.
Jin dan bota, segala iblis,
Segala jemalang dan segala pilak dan bahdi,
Segala hantu sheitan dan segala iblis.
Aku minta hukomkan kapada mu,
Jangan angkau bri mengaru-ngaru menyakit-nyakiti-ku,
Dan anak istri-ku,
Dan segala hamba sahaia-ku,
Dan segala kahidopan-ku,
Seklian SAKI BEGAI *ku.*
Jangan angkau bri segala raiat mu mengaru-ngaru dan merenchanai.
Aku pun sa'orang hamba Allah,
Angkau pun sa'orang hamba Allah,
Mari-lah kita bersahabat.
Dan ber kasihkasihan dengan-ku.
Dan aku duduk didalam afaalillah.
Angkau duduk didalam murka Allah.
Berkat lailahailallah.
Muhammad rasul Allah.
Ya Hu Hak.

[Oh Betara Guru, Betara Kala, do ye order all your servants, the jins, the *bhuts*, all the devils all the powers of mischief all the spirits of Satan and all his devils. I ask you to order them to obey you. Do not interfere with me nor bring sickness upon me, upon my wife and children nor upon my slaves nor upon any living creature of mine. Do not allow your servants to interfere nor make mischief. I am a slave of God as also are ye. Come let us be companions and friends. I dwell in the handiwork of Allah : you dwell in the wrath of

Allah. By the blessing of the saying "there is no God but Allah, Muhammad is the prophet of Allah." YA HU HAK.]

6. This deals with the driving away of forest spirits. We can either drive them away or order them to stand aloof. Whenever we enter upon any enterprise in the great forest or begin to build the larger or smaller elephant enclosure we must repeat the following mantra.

> OM KILAI MAIYUT KACHARI KACHARI KILAI DAK KILAI *dan terbang* KACHANG *ka kanan sah pindah turun* KA WAI HANTU KAMAT KAMAIA NYAMISAN CHANGRAI MAIYU KATUWAI [Fly to the right: without fail leave your place and descend].*

7. This deals with the forest spirits. We either order them away or command them to stand aloof when we are driving the elephants into either the larger or the smaller enclosure. We first repeat the mantra; then we blow with our mouths to right and to left, and then we set off to drive the elephants. This is the mantra.

> OM BARAH BARAI PATARI PANARAI PATA BUNA RAAMIATIN *sah pindah ku turun* LAWI MARAATANGON KAMAI KAMAYAL. [Without fail leave your place and descend].

8. This is the mantra to use when we invade the forest, and it can be used over the *kunyit trus* § that we give to the men as they enter the forest to drive the elephants or it can be used when we ourselves enter the forest.

> OM BIK BIK BANG BANGTU BANGRU BANGTI PADA BANG KUMAI MAYA OM RENGAB SARAPA RENGAB.

It is used for the big elephants as a *perengab.* † Another mantra that has the same effect is the following.

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[*] As is already explained, the words in brackets are a translation of the Malay words only of the mantra.

[†] A *perengab,* or *rengab* charm is one which extinguishes an enemy's power of inflicting an injury.

[§] For *kunyit trus,* and other plants see the appendix.

Om kanching kandai ron pitai naka nara ru pipat chamdi rom ti' paman dapun sarapa rengab.

9. The name of this mantra is *Si Kambing Hutan*, and we use it when we are about to enter the great forest, or to clear the boundary lines for either the larger or the smaller enclosure.

It is as follows.

> Om bangchong bangdi bangru bang tipat bang kamud kamaya om sarp bang sidikan guru ambub atiyah.

10. The use of this mantra is to drive away the spirits when we are about to enter the forest, and the name of it is *Si Kumbang Hutan.*

Om bik bangtu bangdi bangui pada bang kamut maya om rengab sarapa rengab *puah kakiri puah kakanan* [turn aside to right and to left.]

11. This is a *perabun** charm for elephants. We repeat it when about to enter the forest, whatever be our work, and no misfortune will befal us.

> On genaling pachanaru pachanari serbang kom bangkak taka banting laipat puchupai bang kom bang kumaya.
>
> *turun kau pindah kahutan yang pana puah karab turun kapadang yang mahaluas karimba yang maha besar salah ka kanan ku salah ka kiri ku puah.*

[Descend, move away to the boundless forest, in silence descend to the wide plain, to the vast forest ; you are wrong if you turn to right or to left. Avaunt].

12. This is a *perabun* charm which we use when we are seeking a solitary elephant, or when we enter the forest to drive a herd into an enclosure, or when we wish to drive away the forest spirits. It keeps us from all misfortune and mischievous influences in every enterprise in the forest.

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* A *perabun* charm is one which dulls the senses of an opponent and makes him unaware of our presence.

OM GENALING PANCHANARAI SERBANGKOM BANGKAK TAKA BANTING LAIPAT PACHUPAI BANKOM BANGTI KOMLING KUMAYA *turun kau pindah kahutan yang pana puah karab turun kapadang yang maha luas karimba yang maha besar* (practically the same as No. 11).

13. This is the mantra we use when about to drive the herd either into the large or the smaller enclosure. We repeat it over the *kunyit trus* which we then sprinkle in the direction taken by the herd; and then with our months we blow in the direction of the gate of the enclosure.

OM KUNDANG DING KUNDANG SAI TALAUNG TEGULING DI PANTAI RAMBUT TEGULONG DI HADAPAN KU TIBA KANAN TIBALUN KIRI KU SIKAB PIAH NITIK MU HEI CHANG.

Aku tahu asal mu menjadi,
Deripada markubulikam mulia.
Kau turut kata ku,
Jikalau kau ta'turut kata ku,
Mati di bunoh Sri Rama,
Jikalau kau turut kata ku,
Di hidopi maha Rishi.
Kaluh! Kaluh! Kaluh!

[I know whence you had your creation. It was from Markubulikam the noble. Do you obey my words. If you do not obey, you will be killed by Sri Rama; if you obey, you will be kept alive by the Maha Rishi.

Kaluh! Kaluh! Kaluh!]

14. This is a *perabun* charm for elephants, and we repeat it whenever we enter the great forest or any virgin forest that has never been trodden by man. It is an invocation to drive the forest spirits away from the elephants.

OM GENALING PACHANARAI SERBANG KOM BANGKAK TAKA BANTING LAIPAT PACHUPAI BANGKOM BANGKUMAYA *turun kau pindah kahutan yang pana puah karah turun kapadang yang mahaluas karimba yang mahabesar.*

(practically the same as in No. 11).

15. This mantra is called the King of the Elephants.

We go to some high land and make a hole in the ground by turning round on our heel, and we take the earth which we have thus worked out of the hole and over it we repeat the mantra three times in a single breath. We next put the piece of earth upon the crown of our head; then we put it down on the ground in front of us, and again we put our heel upon it, and turn round on it three times repeating the same mantra three times again in a single breath.

The use of it is to stop the herd and to prevent it from going far.

OM PAWPANG MAHA PANG PIT OM TAW SAHOM SITIKON TANA SAHOM.

16. This is to keep the herd fixed in one place and to prevent it from going far. The meaning of it is "in chains."

OM BANG CHANG BANGDI BANGTU BANGRU BANGTI PADA KAMU KAMAYA OM BANG SARAPA BANG AH AH AH.

17. This mantra will restrain the elephants, and prevent them from going far. We break a stick into eight pieces, or we we break it into many pieces, as we walk round the place where the herd is feeding or resting; and as we thus surround the herd we repeat the mantra.

PANTANG POK CHAKÂI TAMANG POK CHAKÂI SANGKANG PAK CHAK AI.

18. This mantra is used when the elephants have entered either the larger or the smaller enclosure. It is repeated over the *kunyit trus*, which the *bomo* * then either himself sprinkles all round the enclosure or gives to the men to sprinkle. While this sprinkling is being performed one must not cross the enclosure.

IKRIMIN PUNI CHI CHANARAK.

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* The *bomo* is the man in charge of the operations. He is selected for his knowledge of the mantras and of the rites, and for his experience. He generally has some pupils under him who are known as the lesser *bomos*.

19. This is the mantra we use when we arrange the noose to prevent it from afterwards slipping from an elephant's foreleg.

> OM KAW KATA CHANGRAMAI KU IKAT PEKARANG KU SERTA PEGANG KAU PERANG LENGAN TANGAN KITA SERTA KANCHUBKAN KAKI KITA.*

20. When we are about to noose a big elephant, and are putting the noose in position, and spreading it out, we pay our respect to Nabi Noh, † and ask for permission to use the tree to tether a *raiat* of Nabi Sleman. When the noose is spread we sprinkle it with *kunyit trus*, and then draw the slip knot, and after that has been done we repeat this mantra. It is a *rengab.*

> OM BAT KU CHABAT DIRADAI BAWBANGKAT CHANG PAJA NAK KARAI OM MAHA RISI BU KATARAK TAN PARA KAMTU.

And again we sprinkle the *kunyit trus.*

21. This is a *perabun* which we use when about to snare an elephant in the enclosure, or about to snare a very cunning elephant in the forest.

We repeat it when we have spead the noose, or we may repeat it over the *kunyit trus* which we may then sprinkle upon the noose.

> OM GENALING BATING TAMDIT BATKALING SALIK SANTOM OM KAMIN PALAI RANG HA TAMKU LIMAPAINA KARKU LASANTOM.

This is an alternative form.

> OM CHAW TAW PALAI RANGKA TAMKU LIMAPAINA KAILIM PARAK NAK TAWTA WANTA.

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* Many of the words of this mantra are Malay, though they do not form a sentence. Their general sense is "tie, hold our hand (or foreleg) and fasten up our leg."

† Nabi Noh (the patriarch Noah) is supposed by the Malays to be in charge of all trees and plants. All animals are under Nabi Sleman (King Solomon).

22. This is the mantra to use when we are about to snare an elephant in the forest or in the enclosure. We use it because we are letting loose the forest spirits, and we repeat it when we set the noose.

> OM KANCHING KANDAI KAI PITAI LAKAROM KAU CHAKAN TANGLAK KON LANGKA PARBU MUHA PURSIDI KAU GURU AMBU YATI.

23. This is a mantra which the lesser *bomos* use when they intend to noose an elephant inside the enclosure. If the chief *bomo* is present he repeats it and the lesser *bomos* say it after him: if he is not present they repeat it without him. It sets them free from all powers that bring misfortune and mischief.

> OM GENALING CHAP CHAP GUNALING RENGAB GUNALING OM CHAP GUNALING SAH SUHAI.

24. This is a *perabun* for a cunning elephant that is suspicious of the noose that we have set for it, and that refuses to go near it. We repeat the mantra over some dainty such as sugar cane or plantain which we put in a place where he will see it and eat it.

PARDOM BANGKOM SUHAI.

25. In order to set a big elephant* free from all evil influences when we take it out of the smaller enclosure we repeat this mantra over some *kunyit trus*, which we sprinkle over the elephant from in front.

> OM GUNALING PARIH PAMPARIT PAI PANA BARASIN MARONG SALIK SAMSATOM SARPATOM PARPAI TATBON TINGTAI PAT KAUCHAT PI HAI HAKATITOM BANGTOM *turunlah pindah kau kahutan pana puah karimba turun kau kapadang yang mahaluas karimba yang maha besar puah rengab.* (practically the same as in No. 11.)

26. This is what happens when the chief *bomo* makes a feast. We make every kind of sweetmeat and sweet thing,

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* The bigger the elephant the stronger its attendant influences of misfortune and mischief.

and gather together all the men who are working in the enclosure, and we all eat together at the gate of the enclosure. We make a prayer that all harm may be averted from us, after that we repeat this mantra three times at the gate of the enclosure.

> PAWBOB YABOB KINDI JUDI TANGPCNG NGAI MALAB MIA JI CHANAK PASTA TARU CHAIKOL CHAKUKAING.

This is an alternative form :—

> OM PUAN OM NYAMIDAK MIDANG MIDAK TIKALANG SATAYANG CHADIN KARAI PAROK PANGALOK TAWMU CHAK KAUCHAK TOM.

27. This is what happens either when the chief *bomo* or the subordinate *bomos* make a feast. The feast can be made either at the gate of the enclosure or in the middle of the enclosure. We invite our friends and feast ; and we supply the following materials *bras kunyit* (uncooked rice dyed with turmeric) and *bras basah* (washed uncooked rice) and *nasi pulut* (cooked rice of a glutinous kind, *oryza sativa*), every kind of sweetmeat, a fish, a little gold and a white cloth. We place these things either at the gate of the enclosure or in the middle of the enclosure, and we breathe (*jampi*) over them the following mantra.

> PARPOM CHANTI RANG TURUN DISITU KARONG PALI PARPAI CHAUPANANG BINGKALA KIN LIYURAK SAMAHALAB MAHACHAI KAIKU ISON RAKAI TANGNAU SUKUN LYU KAULAB KAU KHAN KAIKU KAIKU KAIKU AH AH AH.

28. This is the mantra we use to ask the spirits for the elephant when we are about to put it in the stocks, where it is kept while being taught the words of command.

> OM BAWK KAU NAK KAU NAI RENGAB PATSUWAT PATSUWAT PATSUWAT.

Then straightway we strike the elephant three times with the goad, and the elephant will scream when we do it. Thereupon the elephant will cease to be disobedient, and will obey us.

29. This is a mantra to expel the spirits of the *renat* [the flooring of the stocks]. When the flooring has been made, and we are ready to put the elephant in the stocks, we sprinkle the flooring with *kunyit trus* and sweep it with the leaves of *chandarwal* and *salanchang*.

> OM BARANG BARAT PIKAT PIKAU CHANG RAMBIN PARAI *sah pindah kau turun lari hantu rimba puah rengab.* [move from hence, flee away down, spirits of the forest.]

30. This is the chief of all the mantras used for elephants. We use it in all undertakings and it is the first that we repeat. We can especially use it when we are ready to put an elephant in the stocks, or wish to take the goad to an elephant that has been taken out of the stocks. In the latter case, sitting on the elephant's neck we strike it with the goad, and then throw the goad away behind the elephant. Another man picks it up, and takes it and shows it to the elephant. This is done three times, and each time we repeat the mantra.

> OM GENALING GENALI GENALING NUKTING GENALING NUKTAI KOT KOT TAKONG KALA GUMLUT KOT GENALING TAKONG KALA OM SINGKU PASING CHANGRAI OM SAH KUPASAH CHANGRAI ARAH ARAH TARONG PRAT TINJAU BALI TURUN BERTANTI SALAH DIBATANG TUBOH KU WI MITARAU KAUMILUH SIDIKAN GURU BATIA PARAKAU HEI GALUH AH AH AH.

31. The name of this mantra is the King of the *Bomos.* We use for an elephant with a sore head or fever or pain in its stomach. The signs of fever in an elephant are firstly that a quantity of steam rises from its head after we have bathed it, and secondly that its head is very hot.

We may also use the mantra when we take an elephant out from the smaller enclosure: in that case, we sprinkle some water on the elephant's head after repeating it.

> OM PATA BURA MAISAN KAU CHA NGAU ANGKAT MATANG PIN PINDAH AU KAU KOKLAK MATA CHANGRAI CHANGRAI KACHAT PI TOKPAMIN KUMI PAILU SARAPA CHANGRAI CHANGRAI KAU MIMAN TARA

ANGLAIA SITIKAN GURU MU YATIA OM SITIDAK SITIDANG SITIGARANG KANA PARAK BATU SAM DIAU SAMDAK SAKAIAK SAKAIAK SAKADONGNA ANGNONG CHAMPARAN SIAN ANGNONG CHAMPARAN PAT PAT CHANGRAI ANSAKSI PATARADI SARAPA CHANARAI MATARANG CHANGRAI KAU MIMAN TERINGLU SITIKAN GURU MU BATIA.

32. If an elephant is sick or has fever this is the mantra which we repeat over the water with which we wash it. We may also repeat it over *kunyit trus* which we squirt from our mouths over the elephant. We do this for three or four mornings or evenings.

OM PAPARU PAPARAI PANARI PANARAI MAHASA MAHASA KUNTA PARAH SRI RAMA PARIT TARANG SITI KAN U MAHA RASI RASI YAKTAMA RAHI PARAI AURAB AWAI DAI MUONG SARAPA ANGKAU PERONGKAN SAKANG SAKOM SARAPA RENGAB SITIKAN GURU MU BATIA.

This is another mantra.

OM GENALING GENALING PARAH POM PARAPAI TATBAN YANG KOI PAT KACHAT AI CHAKAT TOM BANGTOM.

turun kau pindah kau kahutan pana puah turun kau kapadang yang maha luas karimba yang mahabesar.

[practically the same as in No. 11.]

33. This mantra is used with unfailing effect to expel all evil influences from a big elephant. It is repeated over *kunyit trus* which is then sprinkled over the elephant.

OM GENALING TING CHANDAPA GENALING ANTING KEMALUT BITI BITI GENALING YAKUT YANATA YAPA PAROM PARNANG GENALING WAI SITIKAN GURU MU BATIA OM RENGAB.

34. To drive away the forest spirits from the little baby elephants we use this mantra.

OM PANIRANG PANARAK *maka jauh angkau pindah kahutan pana puah karimba yang maha besar turun kau kapadang* *yang mahaluas.* [practically the same as in No. 11.] SIDIKAN GURU KAU OM BAK BATIA.

This is another.

OM CHAWI CHAWAT CHAWI CHAMEAT MADA CHOH *kau pindah kahutan pana puah karimba bahana turun kapadang yang mahaluas turun karimba yang mahabesar.* [practically the same as in No : 11] KAMAI MAIA.

35. This is a *perengab* charm for a big elephant. We may either repeat it over *kunyit trus* which we sprinkle over the animal or over *chandarwal* leaves with which we then brush it. If the evil influences are strong we sweep the elephant with a black cloth instead of with the leaves.

OM RENGAB MAHARENGAB CHANG RENGAB UNDAI RENGAB PITI PIAT YAKAROM RENGAB RAKANGLANG KARAHAI RENGAB PADAPAI MAN PONG OM RENGAB MAHARENGAB.

36. This is a *perengab* charm for a disobedient elephant.

OM RENGAB CHANGRENGAB PITAI YAKARU RENGAB PARYOM POM RENGAB RANGKONG KANG KAMARAI RENGAB PADA PAMAN PONG RENGAB MAHARENGAB SIDIKAN GURU AMBOK BATIA RENGAB.

And if the elephant is very disobedient indeed, and refuses to obey us, this is a mantra which may be repeated over the food we give it.

OM RENGAB CHANGRENGAB DAI RENGAB PITAI PIAH YAKAROM RENGAB PARIOM APOM RENGAB RANGKONG KAMARAI RENGAB PUAH RENGAB.

And this is yet another mantra for a disobedient elephant.

OM PADA PAYAMAN PONG OM RENGAB MAHARENGAB SIDIKAN GURU AMBOK BATIA.

37. When an elephant has been in the stocks for three days and we take it out for the first time and bring it down to the water to drink and bathe, we should repeat this mantra.

OM GENALING TANG CHANDAP GENALING ATING KAMALUT GENALING YAKOT YANATA BANA PAROM PARANANG WAI SIDIKAN GURU MU BATIA RENGAB.

38. This is a mantra to ward off evil influences from an elephant when we are taking it back to the stocks after bathing it.

> OM YANG CHANG BANGDI BANGTU BANGRU BANGTI PADA BANG KAMU KUMAIA OM BANG SARAPA BANG OM RENGAB CHANG RENGAB DAI RENGAB PITAI YAKAR OM RENGAB RAKANGLAÑG KARAMI RENGAB PADA PAIAMAN PONG OM RENGAB MAHA RENGAB.

39. This is a mantra which we repeat when we mount the elephant.

> OM PANG PAHAMLOK PALAI PECHAH GALONG OM DIK MAMAN.

40. This sets forth our powers when we are about to entice a solitary wild elephant into a noose by making it follow our tame elephants. If the wild elephant will not follow our animals, we repeat this mantra and then hurl some clods of earth at him.

> MATAPU CHUMKAN MIDON YOH KAYU UMBI KAWAN CHAMKAN LAMANG MANU RA AMBI KAYU AMBI KAWAN TANGWAN TANGWAN PIRAK DUT PIRAK SITUN DURAJA CHAMKAN LANTANGUN RA AMBI KAWAN TANGWAN TANGWAN.

41. This is the mantra we use when we beckon onwards a solitary wild elephant that will not follow our decoy elephant. We take some *chamar* leaves and repeat the mantra over them

> MATAPU CHUMKAN LION NAKCHONG ABIA KASI' AN AMIA KON CHOMKAN LION TANGKON PARIK DOS PARIK SITON DUNANG MAKARU TANGKON.
>
> Another way is to repeat the mantra over three lumps of earth which we then throw at the elephant.

42. This is the *perabun* charm that we use when we wish to catch a herd of tame loose elephants in the forest and find that a male wild elephant is with them. We walk round the herd either once or three times repeating the mantra.

> OM PAU PANG MAHA PANG PIT OM TAU TAU SITI KARTANA SAHOM OM SAUHOM.

As we finish these words we close our eyes.

43. If we go in amongst a herd of tame loose elephants and find a male wild elephant among them we repeat this mantra.

> OM WI CHIT TRAWI KAM BARA AU LA SIPOH SUHOM DAI BANG BENG KOMBANG TIPADA SAM KOM AH AH AH.

44. This mantra will forcibly detain a rogue elephant that is chasing us: we repeat it three times in one breath.

> TOT PARTOT KANCHANG KANDAI KON PITAI TOT HAI.

45. This is a *perabun* charm which we use when we decoy a solitary wild elephant; with closed eyes we repeat it three times over a leaf and then thrust the leaf behind our left ear.

> OM NAK KAMBANG BUKAMBANG THALABYU CHANG HAI PAI.

Another general form of *perabun* charm for elephants is this. We repeat it over two leaves or over three leaves and then thrust the leaves behind our left ear.

> OM NANG KAMBANG BUKAMBANG THALABYU CHANG HAI PAI

46. When we wish to mount an elephant in a herd of tame elephants we repeat this mantra whether there is male wild elephant among the herd or not.

> OM PANG PAHAMLAK PALAI PACHAH KALONG DIK MIMA.

47. When a solitary wild elephant has joined our herd of decoy female elephants we use a mantra to prevent him from afterwards leaving them. We take three limes that grow on a single stem or better still five limes growing one single stem (if these cannot be obtained, two limes growing on a single stem will do), and we pick out the love-grass that has caught in our sarongs. We mix the two together and rub them over our female elephants. We also sprinkle betel-leaf and betel nut over their foreheads. Over the various ingredients mentioned we repeat this charm.

> OM MA BANAK NIK MAKU AW MAK TIK MAK MAKAKAN MANINGKAL KAK KAN TIK.

48. This is a mantra to prevent a solitary wild elephant from fidgetting and disturbing a herd of tame elephants. We repeat it as we walk round the herd, which we do either once or three times.

> OM KASAK KUA TARAK HAK CHAN JINSA NAK SILAK SATAHA TIHAK WI SARA WIKAK WI TRAWA PUTAI YA ATI YAN NIK MAKURI NACHUNG TANGU KAPURUNTA SARA MAMA WI SARA WIKAKH WIPARU PURAK BINAT SIAN TIK *bulan naik jangan bulan turun ikut turut kata Sri Rama.*
>
> [let the moon rise, let it not set: obey the word of Sri Rama.]

49. This is a mantra to make a solitary wild elephant, or a herd of wild elephants, stay in one place.

> TOT SAPAR TOT CHANGLIUM CHANGKAN CHANG SAMA KU DHANGTANG PARPIT SITI KAN GURU BATIK PARAHAI KALU AH TOT.

50. This is a mantra to beckon onward a solitary wild elephant. We repeat it over a *chamar* leaf and then beckon to the elephant with the leaf three times. As we beckon we must not look behind us.

> MATAPU CHOM KAN LION TANGKUAN PARAK DUNANG MAKARU TANGKUAN TANGKUAN TANGKUAN.

51. When an elephant has been caught in our noose, this is a mantra to make it stupid, and to prevent it from inserting its tusks into the slip knot and working the noose open.

> *Hei tunggal terkatup tertutup terkanching angkau disuroh Sri Rama. Ah! Ah! Ah!* [Hei! solitary one! thou art closed up, shut up, bolted up, and this by the order of Sri Rama. Ah! Ah! Ah!]

52. To make a wild elephant amorous of our tame female elephants, we pick some of the weed *tutup bumi* that grows in the middle of the highroads and take it root and all. We chew it with betel leaf and betel nut, and then spit it out on the elephants' forehead and brows and both ears and both

cheeks. We must avoid passing in front of the elephants when we release them and their goads must be kept at home with the goads of our other elephants.

53. This is the medicine for a stubborn elephant that will not learn our schooling. We take some of the *nasi-nasi* plant that grows reflected in the water, and rub it over its chest by its heart and over both shoulders. We do this for three consecutive evenings.

54. This is the medicine to soften the heart of an elephant and make it docile. We take the smaller kind of *gelenggang* plant known as *gelenggang saior* and rub it over the elephant's chest for three consecutive evenings. The plant must be gathered at evening time. Another way of softening an elephant's heart is to repeat the following charm over its food (sugarcane or plantain) for three mornings or three evenings.

OM DARANG MUKANIA
DARANG LANGLI MUKANIA LANGLI
Telunjuk ku akan kosu mu
Hati ku akan chucha mu
Tunduk tedurong kakiri ku
Tunduk tedurong kakanan ku
Kalau angkau ta'tunduk tedurong kapada aku
Angkau di sumpah-i Sri Rama
Tunduk jinak kapada aku
Kalau angkau ta'tunduk jinak kapada aku
Angkau di sumpah-i maha Rishi

OM RENGAB.

[My fore finger on your goad: my wish to subdue your wish. Bow down your head to the left. Bow down your head to the right. If you do not bow down your head to me, you will be cursed by Sri Rama. Bow down tamely to me. If you do not bow down tamely to me, you will be cursed by the Great Sages.]

55. To take away an elephant's ticklishness we take as medicine the great hairy caterpillars of the red kind and rub them over the elephant's thighs.

56. To cure an elephant of the trick of shaking itself free from its load, this is the medicine: we take the roots of the *galenggang* plant, the roots of the *trong asam* and the roots of the sensitive plant*; we chew them with betel leaf and betel nut and spit part of the mixture over the forehead of the elephant and then spit part over its testicles, and after this spit part over both cheeks and both thighs. We do this for two or three days.

Another cure is the following: we take the roots of the sensitive plant and some moss from a stone that has been standing in water, and burn them to ashes, which we then mix with oil, and rub over the elephant's cheeks and thighs.

Yet another way is to take the root of the large species of *galenggang* plant, and chew it with betel leaf and betel nut, and then spit over the elephant's cheeks and thighs for three consecutive days. The plant must be gathered at evening time.

57. This is a medicine to prevent an elephant from swinging its tail from side to side. We take the rubbish that collects about sticks in the water and about the posts which stand in the stream and shake to and fro with the force of the current. We burn this to ashes and mix the ashes with oil which we rub on the elephant's tail for three consecutive evenings.

58. To make an elephant subservient to the goad we take a handful of *kait kait* leaves and rub them over the elephant for three consecutive mornings or evenings; or else when we bathe the elephant. This is another way; if we put gold and silver in a bowl of water, and then bathe the elephant's head with the water, the elephant will without fail obey the goad with alacrity.

And this is yet another way; we take gold, silver, copper and the iron of which cannons are made, and place them in a bowl of water. With this water we then bathe the elephant's head, and at the same time we lay the goad upon its head. We do this for three consecutive days.

**Mimosa pudica*

59. This is the medicine for an elephant that will not kneel at the word of command. We take the root of the male *kanchi* plant that has never flowered, and chew it up with betel leaf and betel nut and squirt over all the elephant's joints. We do this for two three or four days. Another way is to take the root of the gourd plant that creeps over abandoned houses and to chew this with betel nut and betel leaf and to squirt it over the elephant's thighs for two or three consecutive evenings. If an elephant will not kneel or refuses to kneel down in water, we take the moss off the stump of a tree that has been felled to make a boat. We burn the moss to ashes and mix it with oil and rub it on the elephant's forehead and on its thighs.

60. If an elephant refuses, or is afraid, to swim, we take the root of the *kiambang* plant and burn it to ashes which we mix with oil and rub on the elephant's forehead or on its thighs.

61. This is a list of the diseases, of elephants.
Mersud : a swelling of the tip of the trunk.
Merchuan : a swelling of the part under the chin.
Tasab : a swelling of the forehead.
Merkabat: a swelling of the eyes.
Keruan : a swelling of the ear.
Merpuan : a swelling in the stomach.
Mertemulam : a swelling of the genitals.
Mernor : a swelling of one leg.
Mertalam : a swelling of both legs.
Merchap : a swelling of the anus.
Merkabun : a swelling of the rectum.
Merpahat : a swelling of the end of the tail.
Keradan : a swelling of the tip of the trunk.

For this last disease the medicine is to take the leaves of *langkandi*, *prai*, *labu ayer* and *katang-katang tahi lembu* with some whitewash and some salt. We shred these ingredients, or grind them to paste and apply the mixture as a poultice to the swollen part.

The medicines for *tasab*, the swelling of the forehead, is to take the bark of the *ramanggi* and *dedap*, some *kunyit trus*, *lampuyang*, *lengkuas padang* and limes. We place these ingredients in a pot and boil them to shreds, and then apply the medicine to the elephant's forehead, and without fail the disease will be cured.

62. This is the medicine for *merkabat*, the swelling of the eyes. We take some oxhide and burn it to ashes; then add some oil, the leaves and roots of the *pria* and of the creeping gourd plant. We pound these ingredients to a pulp and mix some arrack with it. The whole compost is applied to the swollen part. It is a certain cure.

63. For the swelling of the ears we use this medicine. We take the fruit of the tamarind with limes of the varieties known as *limau mata kerbau*, *limau purut*, *limau krat lentang* and common limes and oranges; of all these we take the leaves and roots as well as the fruit; we chop them fine, and pound them well and then boil them in a pot. With the water we wash the swollen part, and apply the sediment as a poultice.

Now this is a medicine, which we should know, for all ailments of elephants. We take the roots of the *trong prat*, the bark leaves and fruit of some tamarind, the bark of the *kintongan*, common limes, the limes of the varieties known as *limau krat lentang*, *limau mata kerbau*, *limau purut*, *limau raia*; we take from a betel nut tree that has never fruited the young aerial roots that have not yet reached the ground; we also take *kunyit trus* of the white and black varieties, *lengkuas padang*, *lengkuas benar*, *temu lawak*, *halia udang* of the red kind, *juang juang* leaves of the red kind and *teberau*.

All these we pound to powder, and place in water for a night. With this water we wash the elephant all over for two or three days; the sediment we give it to eat in small quantities with its food. After this we should avoid letting the elephant feel the heat of the sun for a few days.

64. We now tell of all the medicines for the diseases of elephants. First of all there is this one which is handed down from

the *bomos* of old. We take the roots and leaves of the *pasamiu*, plantains of the variety known as *pisang miu* with the leaves and root of the plant; we add the roots of *chemandrai hitam, rotan tawar, tutup bumi, kenchar, pianggu, pulai hitam, rotan dini, panggil-panggil, jerun, kuchoi, galenggang, kaduduk, paku, tambun tahi, temu padang,* and *temu kunchi*; we also take limes of the varieties known as *limau purut* and *limau padang*, and the bark of the *kintong.* We mix all these ingredients throughly and then pound them to a pulp. The juice is given to the elephant to drink for three days, or is sprinkled all over its body for three consecutive evenings.

65. If an elephant has sore eyes so that it does not allow us to touch it and carries its head low, we sprinkle black pepper over its eyes for two or three consecutive evenings. If its eyes run with water, we blow at them through a tube either some lime juice or the clear water in which ashes have been standing; we do this for two or three consecutive enenings.

66. This is a medicine for a running discharge in an elephant's eyes. We take the fruit of the *mataiang* and burn it to ashes, which we then mix with water; we strain the water and add some lime juice; we then put this in the elephant's eyes for about three days, and of a certainty the discharge will stop.

67. This is the medicine for a disease of the trunk: we take from some well the vessel which men use to lower into the well to raise water; we take it rope and all, and burn it to ashes, which we mix with a little oil and rub on the end of the trunk. For this remedy to have effect the vessel must have been stolen from its owner.

68. This is a remedy for the disease known as *kesar api.* We take some *lenjuang merah*, the cabbage heart of the *teberau*, limes, *meswi*, red onions, turmeric and white pepper; after chewing these ingredients with betel nut and betel leaf, we squirt the mixture from our mouth over the elephant's body three times on three morning or three evenings. Another way

to pound these articles to powder, to which we add a little water and then sprinkle all over the elephant's body for about three consecutive days.

Another remedy is to take the root of the red *bunga raia*, and the root of the *jarang songsang*; we chew them with betel nut and betel leaf and squirt the mixture from our mouth upon the elephant for three consecutive days or evenings.

This is the medicine for an elephant which has the diseases known as *kesar ayer* or *kesar angin.*

We take about a *gantang* measure of *rembiga* leaves, pound them to pulp and rub them over the elephant's body; or, adding water, apply them as a wash—we do this for four or five days.

Another medicine for *kesar ayer* is as follows: of the *lenjuang puteh* we take the roots, the leaves, and the cabbage heart; we take leaves of the sensitive plant, the bark of the *bongli*, *kunyit trus* of both the black and white varieties *meswi*, red onions and white pepper. All these ingredients, we chew with betel nut and betel leaf and squirt from our mouth over the elephant's body; we do this for two or three days.

This is a cooling lotion. We take the fruit of the *kubong*, the leaves of the *bungkal* and the cabbage-heart of the *teberau*; we pound them to pulp and soak them in an earthenware pot, and then apply for about three consecutive days or evenings.

As we apply it we repeat these words.

OM KAK TIU TIU SAK.

Yet another remedy for *kesar* is this: we take leaves of the *sentang hantu*, *mataiang*, and betel-nut tree; pound them to pulp and add a little whitewash, and rub the compound over the elephant's body for four or five days.

And yet another remedy: we take the red fruit that grows on sand banks, and any kind of fruit of trees whose early leaves are red, and give them to the elephant to eat with a little Siamese salt. Of this medicine we give, in small quantities, as much as the elephant will eat.

69. This is the remedy for fever; we take *gandarusa* and chop it up fine, and soak it with cooked rice. Having done this, we put it out in the dew that night, and afterwards sprinkle it over the elephant's head for about three days.

We must be careful not to expose the elephant to the sun during this time.

70. This is the remedy for pains in the elephant's stomach: we take the bark and fruit of the tamarind and the bark of the *kintong*, the bark of *jambu kapal* and of the *sena*, the fruit of the *tevus rangkinang* and the *rangkir ang kayu*, with its fruit and bark; we pound all these things to a pulp which we give the elephant to eat together with Siamese salt; we may also sprinkle it over the affected part.

71. This medicine kills all the diseases in an elephant's stomach: we take some ripe *trong prat*, *lengkuas padang*, Siamese salt, bark of the *malaka* that has been brought from foreign parts; we split the *trong* and the *lengkuas* into strips, and then pound the mixture to a pulp; then we soak it in vinegar, and after three days we give the liquid to the elephant to drink, and the sediment we mix with the elephant's food, or with a plantain or some sugar cane. We do this for three or four days.

72. This is the medicine for an elephant that is troubled with intestinal worms: we take the white and black varieties of *kunyit trus*, some black valley earth, the cabbage-heart of *teberau*, *meswi*, red onions, and white pepper; we stuff a sugar cane with these ingredients or we mix them little by little with the elephant's food for two or three days repeating this mantra.

OM KAK TUI TUI SAK.

The following medicine will kill all the intestinal worms whose presence in an elephant's stomach prevents it from becoming fat and healthy: we take some saltpetre and carraway seed, and give as much of them as it will eat to the elephant. When we have done this for three or four consecutive days all the worms will be dead.

73. This is medicine for an elephant this is suffering from chill: we take the roots of *trong asam*, and of *rotan dini*,

the pith and roots of the *chekor*, *jeranyau*, *lenjuang merah* and *kunyit trus*; adding a little white pepper, we chew this with betel leaf and betel nut and squirt the mixture from our mouths over the part of the elephant's body that is affected.

If the elephant's body is hot, we take *satawar hutan*, *balongan*, *satawar benar*, *anyor*, *tebu betong*, *lenjuang puteh*, *teberau*, *chapa* and *rotan tawar*; we shred all these very fine or pound them to pulp, and cook them with betel leaf and betel nut. We then squirt the mixture from our mouths, or sprinkle it over the elephant's body for two or three consecutive days.

The elephant must not be exposed to the sun during this treatment.

74. This is the remedy for a swollen foot, leg or shoulder: we take the inner part of some ginger, *kunyit trus*, turmeric, and *lampuyang*; we grind or pound them to pulp and adding a little salt, warm it on the fire; we then apply to the mixture the affected part for three or four days.

If an elephant's ear or leg is swollen we repeat this charm over it.

> OM CHIKAN CHI CHAU SIMAN PALAI AITU RATI DUCHANGU BAYI DUCHANG SAN BISAYI TAB.

75. This is the medicine for a sprain in an elephant: we take leaves of the *galenggang ramanggi* which people use as a vegetable, *nasi-nasi*, the juice of the *tebu salah*, the stem of the *kladi hitam* and a prawn of the variety known as *udang galah*; we bake all these until they are burnt and then put them in some flour which we warm and apply as a poultice to the affected part for three or four days.

76. This is a medicine to cure an elephant of eating earth: we take some earthworms and some black valley earth; we bake the worms until they are burnt and then mix them with the earth which we give to the elephant to eat for three or four days.

77. This is a medicine for an elephant that will not eat heartily: we take some *lengkuas padang* and *lengkuas benar*

and the root of the *pisang-pisang,* and pound them to a pulp which we mix with the elephant's food for three or four consecutive days or evenings.

78. This is medicine to make an elephant fat: we take some *tembakul* fish, and Siamese salt and give them to the elephant to eat. This must be done on the 13th to the 15th days of the month. When we administer this medicine the elephant must be standing in water that covers the swelling of its belly.

This is another remedy: we take *patawali* and the roots of the *trong prat, trong pipit, trong asam* and *mataiang*; we chop them very fine and soak them in some large vessel, adding a little vinegar and Siamese salt; then we give it to the elephant to eat, or we rub it over its body. This must be done the moon is rising.

This is another remedy: we take the roots and leaves of the *lenjuang benar, lenjuang puteh,* the aerial roots of the betel nut tree, the roots of *rambiga* and *mataiang* and some Siamese salt. We give this medicine to the elephant to eat with some plantains, Indian corn or sugar cane, either when it is standing in water as before, or when the moon is rising.

This is another remedy: we take the skin of a rhinoceros' navel and soak it in water with some Siamese salt and some honey. Then we give the elephant the skin to eat with its food: we pour the liquid over the elephant and give it some to drink. We do this for three or four consecutive days.

Yet another remedy is to soak *pedindang* fruit and Siamese salt in honey. We then give the elephant the skin of the fruit to eat; the liquid we either pour over it or give it to drink for three or four consecutive days.

79. This is the charm we use when for the first time we put the pannier upon a new elephant that has never been used before. We first sprinkle the elephant with *tepong tawar* [ceremonial flour] which we address as follows.

Hei Tepong tawar, tepong jati, tepong tawar
Seklian changrai dan bahdi
Turun changrai, turun bahdi, turun pilak
Turun kadalam laut Pauh Janggi.

[Hail, Tepong tawar, pure flour! Hail, all the mischievous and evil influences! Let all the mischievous and evil influences and all misfortunes descend into the sea of Pauh Janggi.]

We then put thepannier on the elephant's back, and sprinkle the water of a young green cocoanut, one over its head and another over the base of its tail. We then throw the cocoanuts at the elephant, the one at its head and the other at its back, and take an augury from the manner of their falling: if they fall on the part that has been opened it is a bad sign, but it is a good sign if they fall with the open part uppermost. While doing this we repeat this mantra.

OM PAT MAHAPAT CHAILA KUPAT KARU HEI CHANGRAI MAYU TAWI SAH.

As soon as we have repeated this mantra we get up into the pannier.

80. This medicine will make our elephant come back to our house of its own accord from the forest.

From an abandoned house we take the cooking place, the ladder that leads up to the house and the threshold beam. We break them up and give fragments of them to the elephant to eat with plantains or Indian corn, and do this for three consecutive days or evenings.

81. This will make an elephant brave in fighting. We take a considerable quantity the roots of the *ketub-ketub* and *panggil-panggil* and pound them into pulp, and give them to the elephant in his food for three consecutive mornings or evenings. This is certain to make the elephant courageous.

82. This will make an elephant sagacious. We take the back of the *ramanggi*, the bark and ripe fruit of the tamarind juice of the ordinary lime and of the variety of sugarcane, known as *tebu betong* and add them to the elephant's food for three consecutive days. Its effect is certain.

When giving this medicine we repeat this mantra.

SUKI TIMA SAPAHA CHARAU SOK SI RA AR ASAUPA KATA YASA SIMA TONKHA TIRU KISARO ASAM PINTU

Before we administer any of the medicines mentioned above we should breathe over the following mantra three times, in order to prevent any harm happening to us or to anything connected with us.

> OM BIRAÑDOK RANDAI KAPARAI PARAI PANDOM SHAROK SAHAROK NYAYOM LI CHAPALOK NAJAM PALING CHAMCHAK IRAK KAN CHAMBOT NACHAM NU LANGMU TARANGKOK MITAROM CHANG TAPING TAU PERIA LAMUNTARI PUAH RENGAB.

This is an alternative mantra.

> OM CHATING CHATING HAKA TANGKAU CHANGKAN BAT KAU TABAT NARIT KONKU SUROH LULOH LULAI PIAH TAUTAR AU YARA WON SATAHA TARA ONG JIBAYON TAHOM BAAMAN MIOK KATA AUI.

83. This is the remedy to use when a person has been affected by *chemahang*, which means in the Malay language the evil influences attendant on elephants or trees, or when a person is affected by *changrai* or by strong *bahdi*. We take the resin that exudes from the *merbau* tree and *chamara petri* and *empelas* leaves, and water from the joints of trees and water from a pig's wallow and ripe fallen limes; we knead them to a pulp with which we besmear the sufferer. And, if God wills, he will recover.

84. This chapter deals with the methods of telling a good elephant from a bad one.

We have to look at the elephant's shape, its stride, its ears, its skin, and at any individual peculiarities or markings that it may have.

Ears so broad that they will meet, a long lobe to the ear, a low forehead, a very long trunk, a tail that reaches to the ground and sweeps its dust, a broad flank, a head that wags to right and left as the animal walks, and tusks that reach down to the ground; if one finds all these points in one animal, it is, according to the *bomos* of old, a very bad sign, and such an elephant will bring poverty upon its owner.

It is very good to find in one animal long ear lobes that lie close to the cheek, a long tip to the trunk and a high forehead ; and an elephant like this will bring wealth and comfort to its master.

An elephant with a short lobe to the ear, the fold of the ear turning outwards and the ear itself being short ; that rocks itself to and fro when standing, that swings its trunk and its tail, and wags its head as it walks ; an elephant like this is not good and will eventually bring loss upon its owner and its own life will be short.

An elephant is a good one if it has the following points, the lower lip close to the upper lip, the lobe to the ear close to the cheek, and the folds of the ear and the tip of the ear turning inwards.

An elephant with twenty white and closely set toes, a long under lip and large testicles is a very good and lucky one.

If the protuberances on the elephant's head are twelve in number, or if it has fourteen toes, or fifteen toes, or if the hairs of its tail grow in two different ways, or if the tip of its tongue is black or its eyes red, the snimalis an evil brute that will bring ill health and sickness upon any one that keeps it.

An elephant with protuberances on its tail, and under its chin and with all its toes black is no good, neither is one with protuberances on its ears especially if they be black or red like blood.

An elephant with a black roof to its mouth or with black at the base of its tongue is no good.

It is a good sign in an elephant if after eating it carefully places in front of it all the food that is left over. It is a bad sign if it scatters its superfluous food right and left.

It is a very bad thing for an elephant to have its tusks streaked with black or red, or to have tusks that cross one another or that curve outwards.

This is the end of the book of mantras used in connexion with elephants, finished on the 27th day of Rajab 1296 ; taken from the mantras of Tunku Mantri Ibrahim bin Jafar, which are in the possession of Che Pandak Abdullah and committed to writing by Toh Sarif Aman ; mantras which have come down from the Datohs Sri Adika Raja of Ulu Perak, Toh Kalaung and Toh Kalalang, to Toh Muda Abdulrauf and from him to the present day.

APPENDIX I.

The Malay system of Elephant Catching and Training.

The method of taking a herd of elephants is probably common to all countries: in a place frequently visited by a herd the Malays build an enclosure either of timber, (when it is called a *kubu*) or strengthened by earth work (when it is called a *pendiat*). It is protected by a deep and wide ditch. Long wings of fallen logs lead the way into the gate of the enclosure, which is known as the "smaller enclosure." All round an area of some miles of the forest in front of this enclosure a line is cleared, and in it little erections of a few branches and palm leaves are built in the trees at regular intervals. As soon as the herd has entered the circumscribed area, which is known as the "larger enclosure" men are stationed day and night in these trees with fires burning, to prevent the elephants from moving out again before all the hundreds of men who are necessary for a drive can be collected. When the elephants have been driven into the "smaller enclosure," a great suspended door is dropped, and all exit prevented.

A solitary elephant is made a victim to female influence. He is induced to join the society of three or four tame cow elephants which are let loose in the forest, and when he has become accustomed to them, the Malays arrange on the ground, in some convenient place between two trees, a rotan noose with the ordinary running knot.

Coming up to the elephant and his harem then on other tame elephants they gently urge the herd towards this noose. A female elephant that is new to him then attracts the attention of the male, and he moves forward to caress her. Urged by the surrounding elephants she moves slowly towards the noose and steps into, and out of, it in safety. The male follows in her footsteps, and as he plants his foot a Malay pulls the knot and he is caught. Of course he rushes away at once, but at the end of the line attached to the noose is a heavy mass of branches which act as an effectual drag upon his progress. Fatigue soon makes him go slower, and then the elephants close upon him again and while two great cows press upon him on either side, a Malay slips a noose upon another leg. Soon each leg is noosed, and then in some convenient place the ends of all four nooses are made fast to trees, and the elephant is a prisoner.

An elephant, whether caught with a herd or in a noose, is kept tied up until it has been thoroughly subdued and quiet, and will submit to being washed and handled. Hobbles are then put on it, and then, tied to another elephant, it is taken down to the river to bathe. From this stage its domestication is gradual.

Then comes its tuition. Under the Malay system every elephant, even one born in captivity and brought up from its birth in the village, has to be taught the words of command in the barbarous cruelty of the *chelong* or stocks. Here it is confined in such a position that it cannot move an inch in any direction while it learns its lessons.

In seven to ten days a clever village reared elephant will have learnt enough to earn its release from the stocks. A wild elephant will require forty to a hundred days.

After this a forest-caught animal is taken about tied to a tame elephant, and gradually the rotans that join them are lengthened, until at last the elephant can be trusted to be let loose. It drags long rotans after it for some time however so that if it attempts to escape it can be easily seized again.

A year should be allowed to elapse between the date of an elephant's being taken out of the stocks and of its being put to use as a beast of burden. During this time it is being perfected in the lessons learnt in the stocks.

APPENDIX II.

Words of Command used in driving Elephants in Perak and Kedah.

PERAK.

Tee-tee—Stand still! Keep quiet!
Tuhuh-tuhuh—Go back! Move backwards!
Dee-dee—Come close! (Used in calling the elephant.)
Hee-hee—Go on!
Umbû—Go to the right!
Klong—Go to the left!
Kohoi-kohoi—Go slowly!
Chîn—Go carefully! (Used where the road is slippery, or going down a steep bank, or through a deep swamp.)
Rabah—Feel!
Kwêt—Pull down! (Used in directing the elephant to remove any stick or branch obstructing the path.
Onh—Push! (Used in ordering the elephant to push down a perpendicular obstacle, as a post, or trees, stump.)
Hoh-hoh—Stop!
Riap—Approach! (Used in ordering an elephant to go along side of a Malay house or pĕlantar. He will bring his head close if riap is said. For the hind-quarters the order is Riap buntut.)
Tĕrum—Kneel down!
Terum puan—Kneel down lower!
Tah—Get up!
Paha'mbû—Keep clear of timber on the right!
Paha klong—Keep clear of timber on the left.
Chelût—Let the howdah slip off; (The gambala (driver) is on the ground.) At this word of command the animal lowers his hind-quarters and lets the rengka slip over his tail.
Tû-i—(Employed to make the elephant stop switching his tail and striking his occupants of the rengka with it.)

Cheng—Put the right foot into the hobbles (sengkala.)

Cherot—Same for the left foot.

Chang—Lift the foot! (To have the sengkăla taken off.)

Tee-tee—Dont! (Used when the elephant takes up water or saliva in his trunk and sprinkles his sides with it.)

San—Let go! (Used when the animal squeezes the gambala's legs with its ears behind which he sits.)

Guling—Roll! (in the water). An elephant being bathed will when told to do so and will get up when roll bangkit or tah is said.

Kot, kot, kot,—(Used in driving an elephant home if, when the gambala has found him, he is too dirty and muddy to be ridden. He will go stright home in front of his gambala at this word of command.)

Riang-riang—Let go! (Used when an elephant objecting to have the tali rût (rattan rope passing under the belly) fastened, puts up one his forelegs and presses it against his body to prevent the rope from being pulled tight.)

KEDAH.

Go on! Hee.
Come! Chee, Cham.
Stop! Hoh.
Turn! Dao (same for right or left.)
Kneel down! Tĕrum.
Get up! Puan.
Move aside! (to avoid a tree), Pei.
Come close! Chit.
Pull down! (a branch), Ao-bûn
Push down! Kwît.
Take care! (e.g., in crossing a bridge.) Koy.
Feel! (with the trunk) Klam.
Climb! Kot.
Stoop down! (head only to let a man get up.) Lût.
Lift up one leg! (to let a man get up) Song.
Don't! Dei.

Don't whisk the tail! Tû-i.
Trumpet! Riak.
Salaam! (by lifting the trunk) Wei.
Pick up! Jûn.
Swim! Chû.

APPENDIX III.

List of some of the Technical Terms used in connexion with the Training of Elephants.

Balei Chelong—The covered in enclosure in front of the stocks. Here the trainer receives his friends and visitors.

Tiang Guru—A stout post in the middle of the *balei chelong.* It is used as a table, and on it are kept all the paraphernalia used in connexion with the elephant's training. It is sprinkled with *tepong tawar* before the training begins, and may not be touched by any one but the trainer.

Galang renat—Stout beams laid on the ground, upon which planks (termed *kayu renat*) are laid. The flooring of the stocks is this above the level of the ground, and the place is easily drained.

Anak Chelong—The two great posts between which the elephant's neck is firmly held.

Galang rusok—The two beams which are fastened at one end to the *anak chelong*, and, running along the elephant's ribs, prevent it from moving its body to right or left.

Galang dada—A stout beam, supported on forked sticks, which passes under the elephant's chest, and thus prevents it from lying down.

Sengkala—Hobbles which bind the forelegs together, and the hind legs together.

Chanang—A small piece of wood fastened between the two *anak chelong* to prevent the elephant from pushing a fore foot between the posts.

Tali Teronching—A broad rattan band round the elephant's hind legs. From it a twisted rattan rope ties the hind legs to any convenient tree or post.

Tali Pul—A rattan which ties each fore leg to the *anak chelong.* [Thus the elephant is in this helpless condition—its neck is firmly nipped and held in by two posts, its sides are wedged between beams, and a beam runs under its chest; its fore legs are not only tied together but also tied to the posts that hold its neck, while as an additional precaution the *chanang* prevents any possible movement; the hind legs are tied together, and also attached to convenient posts.

When one understands what this means, and realizes that a forest caught elephant undergoes from forty to a hundred days of this treatment (the hundred days, let it be understood, being the limit not of the elephant's refusal to submit to training but of its tenacity of life) it is not difficult to believe that the epitaph of great percentage of forest caught elephants is "*mati dalam chelong*"—it died in the stocks."]

Tali Tegun—When the elephant is first taken out of the stocks down to the water to bathe, it bears a skeleton frame work of rattans, in the form of the harness of the panniers (*rengka*) that it is to be taught to wear. The rattans are fitted on to its neck, round its belly, under its tail in exactly the same way as the *rengka* harness. This frame work, which is termed *tali tegun*, serves the double purpose making the animal accustomed to the feel of the harness and of allowing the trainer a safe hold for his scrambles up to, over, and down from, his charge.

Saluar—When an elephant first leaves the *chelong* it wears, suspended from the *tali tegun*, a loose rattan round each leg. These are known as *saluar* (trousers) and by means of them to animal if it becomes obstreperous can easily be tied up.

Tali Taham—A rattan collar round the elephant's neck, by means of which a rattan rope (*tali chawak* firmly binds a half trained elephant up to a trained animal. It is used when a half trained elephant is first allowed out of the stocks. When the elephants are tied closely together, the term is *Chawak Imba.* When the elephant is getting broken in, a little distance is allowed between it and the other animal, and the term is *Chawak Puchong.* Last of all, when the elephant is quite tame the animals are separated by a considerable length of rattan which is considered as little more than a more precaution. This is known as *Chawak Wai.*

Sedang—The technical term for the progress of an elephant's instruction.

Pancharuan—A short stick tipped with a sharp piece of iron.

It is only used to "remind" the elephant. A longer stick tipped in the same way with iron is called a *tanjak*, and is used to hurt the animal. Both *pancharuan* and *tanjak* are unlike the goad (*kosa*) with which the trained elephant is driven.

Pulang Pohun—"The return of the season." The term for the twelvemonth which should elapse between an elephant's being put in the *chelong* and its first having a *rengka* (pannier) put on it.

Barak—During this twelvemonth, the elephant is known as *Gajah Barak.* At the end of the period, when the new *rengka* has been put on the animal with all due ceremonies, the *gambala* takes the animal from house to house calling out "barak" "barak," and everyone gives him something, a little rice, some fruit or a fowl.

At the end of the day, the elephant driver gives a feast to his friends.

Patih Kosa—The technical expression for an animal that is perfectly obedient to the goad.

This is one of the pantuns the *gambalas* sing as they wash their animals.

Tarek puntong batang jarak
Batang resam chondong k'ulu
Tarek lah untong angkau ini barak
Mengikut resam zeman dahulu

APPENDIX IV.

List of plants used as Medicines.

By H. N. Ridley.

Anyor.—*Curcluigo recarvata.* (Amarylledeae) commonly known as Lumbah, a common broad-leaved plant with yellow flowers at the base.

Balongan, or Bulongan.—*Canthium parvifolium* Roxb, or *Gmelina villosa.*

Both of these plants to which the name is applied are thorny shrubs, with acid yellow fruit. The fruit of the latter preserved in syrup is used in consumption by the Malays, and rubbed with lime and garlic on the body for dropsy.

Bongli.—*Zinaiber Casumuuaar* Roxb. A ginger often met with in waste ground in villages, a common ingredient in Native Medicine. The rhizome is used.

Bungaraiah.—The common red *Hibiscus H. rosu sivensis.* The flowers are often used as a demulcent.

Bungkal prob.—*Ctenolophon parvifolins.* A tree.

Chamar—*Zinaiber?* sp. A wild jungle ginger.

Chamara petri—Chamara is the *Casuarnia equisetifolia.*

Chapa—*Blame a balsamifera* (*Compositive*) also known as Sembong, a tall herb with a strong camphoraceous odour. The dried leaves used in a variety of diseases, for colds, colic, etc. Powdered and blown up the nose of a horse they are supposed to cure it of a cold.

Chekor.—*Koempferia galar nga*, L. A small kind of ginger with broad flat leaves white flowers and an aromatic rhizome, often cultivated, probably native of India or Siam.

Gandarussa.—*Jasticia Gendarassa* (A canttiaceae) a shrubby plant with narrow leaves, common in villages, and of unknown origin, commonly used in Medicine for all kinds of ailments, and also in Magic.

Halia Udaug.—Hahyabara small leaved ginger (*Scitamineae*) A slender wild ginger with a small rhizome, inhabiting forests.

Tambu Kapal—*Engenia* Malaccensis var. A very big variety.

Jarang Songsang—*Cymbidium Finlaysoniasm* (*Orchideae.*)

Jeringau.—*Acorus Calamus L* (Aroidae) The sweet Flag, a native of the North Temperate zone, and probably, introduced here from China, a swamp-plant with long sword shaped leaves and an aromatic rhizome commonly planted in villages and much used in medicine.

Chemandrai hitam.—A herb ceous plant apparently one of the *compositae.*

Dedap.—*Erythrina* sp. (*Lequminosae*). The commonest species here is *E. Stricta.*

None of the species are really wild here, but are cultivated as props for pepper etc.

Empelas.—*Tetracera Assa* (Dilleniaceae). A chimbre with white flowers.

Gelenggang.—*Cassia alata*, (Leguminosae). A shrub with orange flowers in spikes probably originally American now widely dispersed all over the tropies. The leaves applied externally are a well-known remedy for Kurap, and other skin diseases, used internally are purgative.

Gelenggang sacar *Cassia Tora.*

A common weed in villages, with yellow flowers and long beans, the seeds of which are in some places used to make coffee.

Jerun.

Juang-Juang—*Dracaena Parteri Liliaceae* and other wild Dracaenas. Low shrubs with broad or narrow green leaves, and spikes or panicles of white flowers, with no known properties. Senjuang and Lenjuang appear to be used as synonyms.

Lenjuang merah is *Cordylire*—var *ferrea*, the red Dracaena of gardens, a native of the Polynesian Islands.

Lenjuang putih is I believe the green leaved form.

Lenjuang Benar, is probably *Dianella ensifolia*. A common liliaceous plant with yellowish white or blue flowers and berries.

None of the plants seem to have any properties at all.

Kaduduk, commonly known in the south as Senduduk, *Melastoma malabathricum* a (*Melastomaceae*) A common pink flowered shrub. The leaves are astringent and used in dysentery.

Kait-kait.—*Uncaria* spp. (*Rubiaceæ*) The wild gambiers; climbing shrubs with hooks, (whence the Malay name) are indiscriminately known as akar kait-kait.

Kanchi.

Katang-katang Tahi Lembu.

Kenchar ? Kenchur *i.e.* Chekur.

Katub-katub, ketop-ketop, *Bauhinia bidentate* and other species (*Leguminosæ*) Woody climbers with orange or red flowers.

Kiambang.—*Pistia Stratiotes* (Aroideae) The Waterlettuce, a common floating plant, with a rosette of velvety leaves often cultivated by Chinese to feed pigs.

Kintong; kintongan.

K'ladi hitam, *Xanthosoma violaccum*, A cultivated aroid introduced from S. America.

Kubong.

Kuchai, Chives, The common little onion grown here as spring onions.

Kunyit, Turmeric; (*Curcuma longa*)

Labu, Labu Ayer Pumpkin, *Cucurbita pepo* L (*curcúrbitaceae.*)

Lampuyang, *Zingiber Zerumbet* Roxb. (*Scitamineœ*) A ginger commonly met with in villages, with an aromatic rhizome.

Langkandi *Vitex Langundi* (*Verbenaceœ*). An aromatic shrub with blue flowers, very commonly used in native medicine.

Lengkuas benar, *Alpinia Galanga* L (*Scitanineœ*) the greater Galangale, a tall herb with white flowers, and an aromatic rhizome, used in curries and also in native medicine.

Lengkuas padong, *Alpinia conchigera* Griff. A shorter and more slender wild species common in damp spots, often in villages.

Lenjuang, see Juang-Juang.

Malaka, *Phyllanthus pectintus* Hook fil. (Euphorbiaceae). A tree with very fine foliage, and globular acid fruit.

Mataiang. *Ardisia* sp.

Merbau.—*Afzelia palembanica* (*Leguminosae*). The well known timber tree.

Meswi.—*Cinnamomum, xanthoneurum* (*Laurineae*). The bark of this tree known in trade as Massoi bark, is imported into Singapore from New Guinea. It is very aromatic.

Nasi-nasi.—*Eugenia zeylanica* (*Myrtacoe*). A tree or shrub growing often near the water, with white flowers and white aromatic fruit.

Paku.—Fern.

Pasamiu.—? Pisang minu, Musa Malaccensiss, a wild Banana.

Panggil-Panggil.

Patawali.—Tinospora cordifolia.

Pedindang.—*Trichosanthes* (*Cucurbitaceae*). A climbing wild pumpkin with brilliant red fruit stated commonly to be "Mabok" is poisonous but not deadly only used in medicine so far as I know in cases of headache where the fruit is plastered on the head.

Pianga.—*Clerodendron nutaus* Wall (*Verbenaceœ*). A jungle shrub with white flowers. Properties unknown.

Pisang-Pisang.—A name applied to a number of anonaceous trees on account of the resemblance of the fruit to bunches of plantains.

Prai.—*Elateriospermum Tapos* Miq. (*Euphorbiaceae*). A big tree the seed of which is eaten, and forms in some parts of the peninsula an important article of food to the Sakais.

Pria.—*Momordica Charantia* (*Cucurbitaeoe*). A popular vegetable of unknown origin. The fruits are yellow and wrinkled, with seed enclosed in red pulp commonly cultivated.

Pulai hitam.

Ramunggai or Morungei.—*Moringa ptery gosperma* (*Moringeae*) A shrub or small tree commonly known as the Horseradish tree probably a native of India. The leaves, fruit and roots are all eaten

Rambega *Calotropis procera*, (*Asclepiadeae*). The Mudar fibre plant, Native of India, half cultivated and occurring sporadically in sandy spots.

Rangrinang Kayu.

Rotan Dini.

Rotan Tawar. ? Calamus aquatilis Ridl.

Salanchang.

Setawar benar. *Castus speciosus* L (*Scitameneae*). A common plant with large white flowers on the edges of woods. Properties unknown, but popular among the Malays in medicine and magic.

Setawar hutan. *Forrestia Griffithii* Clarke (*Commelinaceae*) a hairy herb four or five feet tall, common in forests.

Sena. *Pterocarpus indicus* L (*Leguminosae*) a well known tree.

I take this to be the drug referred to in this paper, as the bark is the part used. But "Sena" is also used for what is properly called Sena Makki the Senna leaves of commerce, a well known purgative imported from Arabia (*Cassia angustifolia* Vahl)

Sentang hutan Ixora?

Tambun Tahi, *Baccaurea* sp. (*Euphorbiaceae*).
Tebrau.—*Saccharum Arundinaceum.* Elephant-grass (*Gramineae*). A large kind of wild sugar cane common on river banks.

Temu padang.—*Curcuma.* sp. Temu hitam.

Temu Kunchi.—*Gastrochilus pauduratus* Ridl. A small ginger with an aromatic rhizome much valued in native medicine.

Temu Lawak.—*Curcuma Zedoaria* Rose. A half wild turmeric, the zedoary common in villages. The rhizomes are often sold in the bazaar, and used in curry, and in medicine. Formerly valued as a drug in European pharmacy.

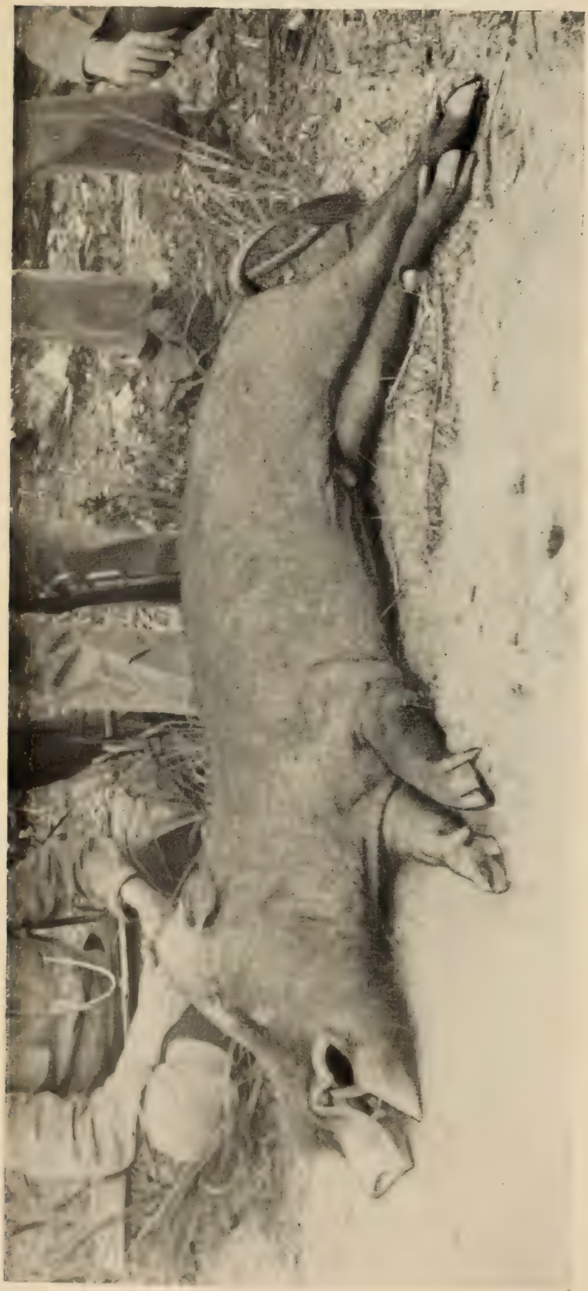
Tepus Rang Rinang.

Trong asam.—*Solanum ferox* (*Solanaceae*)

Trong pipit.—*Solanum sarmentosum.*

Trong prat.—*S. indicum.*

Tutup Bumi.—*Elephuntopus scaber* (*Compositae*). A common weed with flat leaves and small pink flowers in a head, occurring in grass plots and waste ground, probably introduced from South America, a decoction of the roots is used for coughs by the Malays.



Sus oi. Full grown boar.

The New Sumatran Pig.

Sus oi in the Rio-Linga Archipelago.

By C. Boden Kloss, F.Z.S.

In September 1901 a single specimen of a peculiar pig was obtained up the Indragiri River, E. Sumatra by Dr. W. L. Abbott who presented it to the U. S. National Museum. According to the natives of the locality, the "nang-oi," as they call it—thus differentiating it from the common pig—is abundant in the forest and sago plantations along the banks of the river and its foot-prints may always be distinguished from those of *Sus vittatus* by their much greater size.

From this one specimen a new species, *Sus oi* was described and it was, until recently, the only one on record, but lately other examples of what appears to be the same animal have been obtained by Mr. J. E. Romenij and others on Pulo Battam. As most of the islands of the Rio-Linga Archipelago possess their own forms of monkeys, rodents, mouse-deer, etc., it is possible that these pigs may eventually be found to differ sufficiently from the animal of the Sumatran mainland to form an insular race although less probably than is the case with the others, for pigs do not seem liable to as great variation. At present, however, they appear to be the typical *Sus oi.*

Mr. Romenij communicates the following with regard to them.

"These pigs were hunted in the way customary here, viz., with a number of Kling trackers and beaters and a pack of wild dogs, mostly pariahs. During the few weeks that I had at my disposal to go out shooting I went regularly to Pulo Battam and got to know the places where these pigs were to be found, with the result that we bagged several of them and amongst these some fine big boars. The largest one that was shot there was unfortunately lost on the way back, as the sampan, in which the carcase was towed behind the launch, got upset in a rough sea. The photograph of a very fine boar shot by another party shows the abnormal size of the head in comparison with the body and funny light coloured bumps on the head which the ordinary wild pigs don't show. This was a very old chap. My boars seem to me to be in a better condition and more in proportion with *long* and heavy bodies and standing high on their legs.

"I think I have told you before that I and others have frequently been to the same island in former years but never came across this kind of pig, and I can only conclude that it is the pineapple plantations now opened up near the coast, which have drawn them lately from the more interior parts of the island.

"In Java, I am told by old sportsmen, there exists a kind of wild boar which also has the hairy warts on the nose but no beard or whiskers* same as the Pulo Battam boar has. Some North Borneo planters who have seen my head, say that the N. Borneo boar† is more yellowish and that an old sow there has even far heavier whiskers and hairy warts than any boar: there is therefore a good deal of difference between these and the Pulo Battam pigs.

"The same kind of pig is said to be found on Pulo Bintang (Rio)."

Below is the description of the type specimen :—

Sus oi sp. nov.

MILLER. PROC. BIOL. SOC. WASH. VOL. XV. 1902

"*Type.*—Adult male (skin and skull) No. 113,150 United States National Museum. Collected on banks of the Indragiri River (about 30 miles above mouth) eastern Sumatra, September 20, 1901, by Dr. W. L Abbott. Original number 1319.

Characters.—Externally most like *Sus barbatus*, but with body even more scantily haired (there is no mane and the skin

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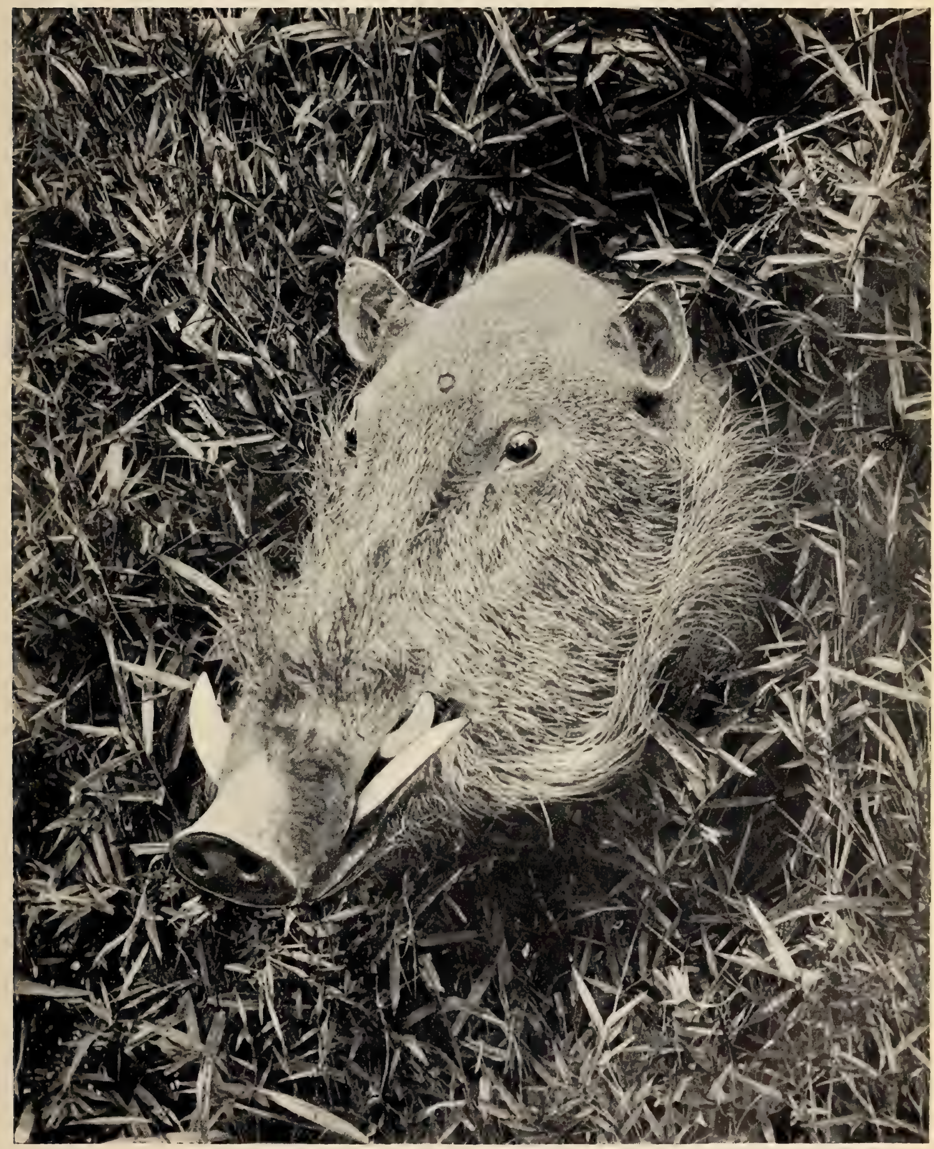
* Sus barbatus.

† Sus verrucosus.



Sus oi. Head of boar.

is nowhere concealed by the bristles except on the face), and two well-developed warty protuberances on muzzle. Skull essentially as in *Sus longirostris.* Teeth smaller than in *Sus longirostris* or *S. barbatus,* the posterior lower molar greatly reduced in size, much as in *Sus celebensis.*

External features.—The body and neck are sparsely and uniformly sprinkled with black bristles which nowhere conceal the yellowish white skin. On sides and belly they are very stiff, closely appressed and directed backward, about 20 mm. in length and nearly ·5 mm. in diameter. On legs they are less coarse in texture and sufficiently numerous to produce a distinct dark shade. Along middle of neck and back they increase in length to about 50 mm., the diameter at the same time decreasing to ·3 mm. The hairs form no mane, but throughout the region where it occurs in other hogs the hairs are less scattered and appressed than elsewhere. They are black, tipped with yellowish brown. Head as in *Sus barbatus,** except that about midway between eye and muzzle there are two well-developed protuberances 30 mm. in length and 20 mm. in breadth densely coverd with stiff antrorse bristles. These bristles as well as those of the upper part of the face are uniformly yellowish brown. On cheeks they are strongly intermixed with black. Tail scantily covered with stiff black hairs about 25 mm. in length. They nowhere conceal the skin, but on terminal third are sufficiently close-set along sides to form a distinct flattened brush.

Skull.—The skull so closely resembles that of an adult male *Sus longirostris* from Borneo that it might readily be supposed to belong to an individual of the same species.

Teeth.—The teeth, with the exception of the canines, are uniformly smaller and narrower than those of *Sus longirostris.* Upper incisors wide apart, the second separated from both first and third by a space of 15 mm. (in *S. longirostris* the distance between second and first is 5 mm., that between second and third only 2 mm.). Posterior upper molar with last tubercle less than half as large as in the corresponding tooth of *S.*

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*See plate xxx, of Verhandel. over de Natuurlijke Geschiedenis der Nederl. overzeesche bezittingen.

longirostris. Third lower molar consisting of only two cross ridges and a terminal heel, the entire length of the tooth much less than that of the tooth preceding teeth combined. In form it closely resembles Nehring's figure of the same tooth in *Sus celebensis** and is very different from that of *Sus longirostris* and *Sus cristatus.*†

Measurements.—External measurements of type: total length, 1870; head and body, 1575; tail, 295; height at shoulder, 850; height at rump, 800; ear from meatus, 88; ear from crown, 97; width of ear, 75. Weight 113 kg. Cranial measurements of type: greatest length, 480 (465)§; basal length, 405 (390); basilar length (to tip of premaxillary), 410 (397); palatal length to tip of premaxillary. 330 (—); width of palate at pm. ‡, 50 (45); zygomatic breadth, 162 (148); least interorbital breadth 80 (76); length of nasals, 240 (230); greatest breadth of both nasals together, 38 (38); occipital depth (to lower rim of foramen magnum), 140 (140)."

I have recently had the opportunity of examining the skull and freshly flayed skin of a Battam boar presented to the Raffles Museum, Singapore, by Mr. Romenij and have been struck by certain details in which it differs from the above characters, but as this is merely a comparison of one isolated individual until the description of another it is unsafe to draw any conclusions.

On roughly comparing the partially cleaned skull, however, with those of three *longirostris*? boars in the Raffles Museum from the Baram R., Sarawak, the greater facial angle and breadth of palate and lower jaw were immediately noticeable.

A space of 10 m.m. only separates the upper incisors from each other.

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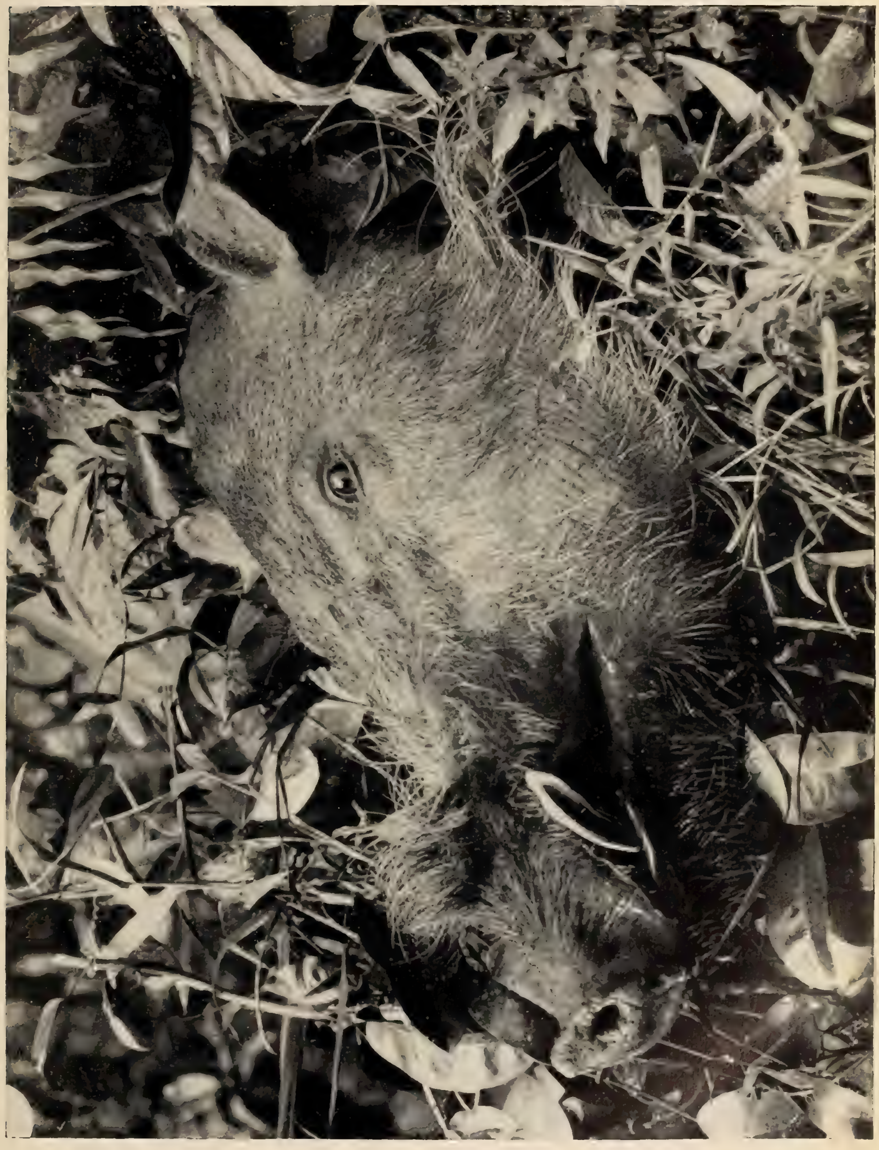
*Abhandl. u. Berichte des K. zoologisch. u. anthrop.-ethnol. Mul. zu Dresden, 1888–1889, pl. ii, fig. 8.

†In *Sus barbatus*, this tooth is, according to Nehring, of the usuas form, that is with three cross ridges and a terminal heel.

‡Measurements in parenthesis are these of an adult male *Sus longirostris.*

STRAITS BRANCH, ROYAL ASIATIC SOCIETY.

JOURNAL 45. PLATE III.



Sus oi. Head of boar.

The colouring too is somewhat different. The scantily haired skin is generally covered with an equal mixture of pale yellowish and black hairs, the former darkened and the latter bleached for two to three millimetres at the tip, but this particolouring is only remarked on close examination. The growth, however, is so slight as not to detract from the dirty yellowish appearance of the body which is thus contrasted with the outer sides of the forelegs that are almost entirely black, as are the lower hind-legs also, but to a less extent; while the short bristles between the bare snout and the warts are grizzled black and whitish. The fore-head and inter-orbital region are freely sprinkled with short, pure white hairs very slightly yellowish at the tips.

The spatulate-like growth of coarse black bristles on the distal third of the tail is very noticeable and forms a marked point of difference from *Sus barbatus* and *longirostris* in which the tails are covered with bristles throughout in all the examples I have seen.

The warts on the nose are elliptical in shape, the greatest diameter being about 50 m.m. and they rise some 40 m.m. above the skin surface from which they spring: they are entirely cartilaginous and in no way connected with the skull.

Between the eye and ear and at the angle of the lower jaw the skin forms almost a distended pocket and it is from the ridge of this excrescence that the curled whiskers, which show such a remarkable developement in some specimens, take their rise.

The animal is practically maneless except for a slight lengthening of hair above the neck and shoulders but this is only visible when closely looked for. The specimen under discussion stood 39 inches (990 m.m.) high at the shoulder and the length from tip of snout to tail—unfortunately taken along the curves of the body instead of in a straight line—was 73½ inches (1866 m.m.)

The teeth show it to be fully adult and while the skin of a *cristatus* or *vittatus* boar of the same age would have shoulder shields little less than an inch in thickness this *Sus oi* skin not only shows no thickening at all in that region but is remarkable for its exceeding thinness throughout.

In a note on *Sus oi* in the "*Field*" of August 13th, 1904, Mr. R. Lyddeker (apparently basing his opinion merely on two photographs of Mr. Romenij's specimens) is inclined to doubt whether it can be separated from *Sus barbatus* and also repeatedly claims it as an addition to the fauna of the Malay Peninsula.

Without going into the question of the validity of *Sus oi* as a species—save to remark that it is doubtful whether there is at present in Europe sufficient material with which to refute Mr. Miller's opinion of its distinctness—I cannot refrain from pointing out that it is impossible to claim this pig for the Malay Peninsula on the strength of its occurrence in Pulo Battam since the affinity of the fauna of the islands of the Rio-Linga Archipelago—although strongly specifically differentiated in many respects—is entirely with that of Sumatra.

Only one species of wild pig is at present known to occur in the Malay Peninsula and that is the animal regarded as identical with *Sus cristatus* of India, and I see no more reason for now claiming *Sus oi* for the Mainland than there would have been for including in the past *Sus vittatus*, *Presbytes maurus* and other animals that occur in the above islands, amongst the fauna of the Malay Peninsula.

(The plates illustrating this paper are from photographs lent by Mr. Romenij).

Some Mouse-deer Tales.

By R. V. Winsedtt.

These tales of *Si Kvnchil* or *Si Plandok* were copied down by me almost word for word from the narrative of a Malacca Malay, whom I met casually in Perak. He was a man some thirty years old and he told me he had heard the tales as a boy from a Javanese settler in Malacca, who translated them for the pleasure of his Malay acquaintances from a thick Javanese book: he added that the book was in manuscript and looked old. His recital was racy and colloquial and had none of the artifice and literary graces of the professional rhapsodists. He said, he could only remember a few tales. These are they: tales of the Mouse-deer, his wit and the carking cunning "which keeps his body so thin and his eyes so large and bright."

I once narrated the first of my tales to some Kuala Kangsar boatmen on the Perak River, and they capped it with a story of identical moral, where however it is a man who releases a tiger from a trap and the tiger in return threatens to devour the man, and a river-bank is called upon and attests the ingratitude of men and beasts; till at last the mouse-deer lures the tiger into the trap again, to see how the man can release him! These same boatmen substituted the phrase "Nabi Sleyman's belt, *tali pinggang*" for "Nabi Sleyman's turban" in the story of the mouse-deer with the snake and the tiger. Apparently, many Mouse-deer tales are told, of the same gist but with slightly different dress: and this is only to be expected, when they are circulated merely from lip to lip. I have not got the book by me and my memory may play me pranks: but, so far as I can remember, the tale of the mouse-deer enticing the lion into a well to fight his own shadow, which appears in the Hikaiat Gelila Demina, appears in a slightly different shape in Mr. Skeat's little book of folk-lore tales.

Mr. George Maxwell and others have reminded me, that one of these tales of mine bears an extraordinary resemblance to that of Brer Rabbit and the Tar Baby.

The only story which I have abbreviated and altered verbally in translation, is the rather indelicate anecdote of how *Si Plandok* behaved, when he leapt right into the tiger's maw.

* * * * *

Once upon a time, a tall tree by a river-bank fell suddenly and pinned down a crocodile by the tail. It happened, that some buffaloes came down to drink hard by and the crocodile besought them to lift the fallen tree and release him. One of the buffaloes answered, "But how can we release you? how can we lift the tree? We have neither fingers nor paws, wherewith to grasp its trunk." "No, my friends," said the crocodile, "but you have strong horns and foreheads: of your mercy, place them under the trunk and heave all together." Then, three buffaloes pushed their horns under the tree and heaved all together and raised the trunk. And, the crocodile slipped out, like an eel that has had his tail nipped, quick as lightning; and forthwith siezed the hindleg of the biggest buffalo in his jaws. The buffalo cried out with pain and anger. "What is this? Have I not helped you that you serve me thus? Why do you requite evil for good? But, the crocodile only bit the harder. Now, Mr. Mouse-deer had come up, while this was going on, and jumping upon the tree-trunk said to the buffalo. "Why, do you ask such stupid questions? It is the nature of beasts and men to be ungrateful. See, here is an old sleeping-mat drifting down-stream. I will ask it about the matter." Therewith, he called out, "Ho, sleeping-mat, is it the custom of the world to requite good with evil or with gratitude?" "With evil," answered the mat: "I was once clean and new, soft to lie upon and comporting to my master, but see, now I am old and worn, he has flung me adrift in the river." "Hear that," quoth the Mouse-deer: "but I will enquire, also, of this dish-cover I see floating down." And he called out, "Ho, dish-cover, is it the custom of the world to requite good with evil or with gratitude?"

"With evil," answered the dish-cover: "I was once bright and new, fine with silk and gold thread, the pride of my mistress, but see, now that I am torn and tarnished, she has cast me away on the river." "Hear that?" quoth the Mouse-deer. "Don't ask stupid questions, you silly buffalo. But, as for these creatures lifting that tree-trunk and setting you free, Mr. Crocodile, I don't believe a word of it, and I won't, till I have seen it with my own eyes. Let go that old bull's leg: it is very tough: and keeping your eye on yonder baby buffalo, who cannot run far and is very tender eating, just tell these beasts to lift up this trunk, as you want me to believe they lifted it just now, and then only will I accept your story." So; the crocodile was nettled, and did as the Mouse-deer asked, let go the bull's leg and approached the trunk to instruct the buffaloes how to raise it, once more. Then the buffaloes strained and strained and lifted it a little. "See," said the crocodile, peering and pushing right under the trunk to watch the work, "see, up it goes." "And down it goes," yelled the Mouse-deer: "down with it, you buffaloes, quick, quick, on top of the rogue." The buffaloes dropped the tree, and there was the crocodile pinned fast beneath it and sore wounded, "As long as there is a crocodile in the world," said the dying beast, "he shall be your foe and the enemy of all your tribe, you accursed mouse-deer." "Well, well," answered *Si Plandok*. "as long I am in the world, my wits shall be my friends, I hope."

Then the Mouse-deer went on his way up hill and down dale, through jungle and plain; till he was faint and thirsty. At last, he came to a stream and went down to drink. "There are no crocodiles here," he thought to himself, and he drank from a brook, his back turned to the big river. But a crocodile crept up and seized one of his hindlegs. "Ho," said he, nearly screaming with pain, "I was mistaken. What is to be done now? Mr. Crocodile, sir, why are you biting a dead branch?" "Call your leg a dead branch?" laughed the crocodile. "That's not my leg," said the Mouse-deer, "taste it carefully: don't bite or you'll miss the flavour: does it not taste like dead wood ?" "Indeed, it does", replied the crocodile, letting go. "But it was my leg, all the same," said the Mouse-deer, as he leapt up the bank.

Then the Mouse-deer bethought him how he should get across that great river and escape his enemies the crocodiles. After a while, he drew near to the bank and cried out, "Hi- all ye crocodiles, rise, float, I command you." "Pray, who is this that commands us," asked a crocodile, lifting his head, "I am the messenger of *Nabi Sleyman.* Rise, ye crocodiles rise, all of you, float on the surface of this river, all ye that are in this river; for it is the will of the prophet Sleyman that I count all you his slaves: in the name of *Nabi Sleyman* I conjure you rise and float." Then all the crocodiles floated on the top of the water. "Come, all of you, herd together," said the Mouse-deer, "or I cannot count you truly." And all the crocodiles crowded together, till they stretched from one bank of the river to the other. "I will count you one by one," said the Mouse-deer; "so that there shall be no mistake in my reckoning." "One," said he, as he leapt from the bank on to the back of the nearest beast: "two" and he leapt on to the back of the next; "three," and he was on the back of a third: "four," "five," "six," "seven," "eight," "nine,"—"ten," said he, as he jumped to the opposite bank and "done" said he: "I reckoned truly and now my reckoning has brought me across, you may sink, you foolish crocodiles."

Then, the Mouse-deer continued his journey up hill and down dale, through jungle and plain, till he was tired and hungry. And he saw the red-shooted shrub (? *lamah-lamah*) which Mouse-deer love, and ate the shoots and went on his way, his mouth streaming red slaver. By and by, a sambur-doe met him and asked, why is your mouth red like that?" "Ah," said the Mouse-deer, "some kind jungle folk in yonder Kampong gave me betel to eat: they invite all comers; you had better go, too." Now, sambur deer love betel. "Show me the way," said the doe. "Straight ahead," answered the Mouse-deer, "and tell the folk I told you to go." "Thank you, Mr. Mouse-deer," said the doe and off she ran as fast as she could to get betel. But the folk there had set a snare to catch any beast that came to their gardens and the sambur doe was caught fast. Then, those folk came out to kill her. "Alas !," she protested, "it was a mouse-deer told me, I should be welcome," "Welcome indeed," said the folk, "for you are the rascal that has destroyed all our betel." So they killed the sambur-doe.

But as Mr. Mouse-deer went on his way, a young sambur-deer met him and asked him, "where is my mother ?" Then, the Mouse-deer answered: "how should I know?" "You lie," answered the sambur and rushed at him to kill him; "she is dead and it is your doing." But the Mouse-deer leapt aside into a deep pit, where his enemy dare not follow. So, the sambur went away and *Si Plandok* was left alone, to reflect how he should get clear of a pit which was too deep for him to leap up and out. At last he called so that all the beasts of the forest came and asked him what he did there. "Ware sky," cried the Mouse-deer, pointing to the drifting clouds, "I'm down here, because the sky is about to fall, and if you care for your lives you'll all of you jump down as quick as you can, before it falls and kills you." Thereupon, all the beasts began to tumble in, one on the top of the other. "Don't crush me in this narrow space," quoth the Mouse-deer, leaping on the buffalo's back: "don't crush me," and he jumped higher on to the tiger's back, and thence on to a deer's, so out and on to the bank and away. Then, the Mouse-deer wandered on till he met a huge tiger. "I shall eat you," said the tiger. "Don't," prayed the Mouse-deer, "I entreat you, spare me." "I shan't : I'm very hungry," said the tiger. "Well open your mouth wide agape and I'll jump in," said the Mouse-deer, "that will save you trouble." "All right," said the tiger and did as *Si Plandok* asked him. The Mouse-deer leapt hard and straight for the tiger's gullet and tore his way right through the tiger's body; then, popping out his head, shouted to a goat grazing near to be off, before he should be caught and killed. "I must stop this back-door treachery," said the tiger and espying a pointed stick began to thrust and press himself against it, but slipping down smartly let the stick pierce right into his body so that he died. But *Si Plandok* leapt out and escaped.

Then, Mr. Mouse-deer took counsel with himself. "I have many enemies, the crocodile, the deer, the tiger and all the beasts I lured into that pit. What shift is there for me to save myself alive?" And he came to a wild wasps' nest. "Good," said he, "I will bide by this nest." Presently, a tiger found him and asked him his business. "I guard *Nabi Sleyman's* gong," said the Mouse-deer, pointing to the nest. "May I strike it?" asked the tiger. "Of all things, I should like to strike it: and, if you let me do so, I will not eat you." "You may," answered the Mouse-deer, "but, with your leave, I will go a long way off first or *Nabi Sleyman* will be angry. "All right," replied the tiger. Then the Mouse-deer went a long way off till he came to a clump of bamboos: and there he waited. Then, the tiger smote *Nabi Sleyman's* gong and all the wasps came swarming out and stung him till his face was swollen. So, he bounded away in a rage and went to where the Mouse-deer stood. "Knave, villain," said he, "see my face all swollen. Now I will kill you. But what is this bamboo you are watching?" "It is *Nabi Sleyman's* viol," said the Mouse-deer, pointing to a slit stem, in which the wind sounded. "How do you play it?," asked the tiger. "Lick it here with your tongue," said Si Plandok, pointing to the slit. "May I?," asked the tiger. "Yes," said the Mouse-deer, "but with your leave, I will go a long way off first or *Nabi Sleyman* will be angry. "All right" said the tiger. Then Mouse-deer went a long way off and stood by some filth. Then the tiger licked the bamboo; and a gust blew and closed the fissure, so that the end of the tiger's tongue was pinched off: and that is why tigers are short-tongued to this day. So, he bounded away in a rage and went to where the Mouse-deer watched over the filth. "See the hurt you have done me, accursed one," said the tiger, showing his tongue: "now, of a truth, I will slay and eat you. But, first, what is this filth that you guard it?" "It is *Nabi Sleyman's nasi Kunyet*," said the Mouse-deer. "May I eat it ?," said the tiger. " Of all things, I should like to eat it : and if you let me do so, I will not kill you." "You may," said the Mouse-deer, " and perhaps it will cure your tongue : but first, let me go a long way off or *Nabi Sleymàn* may be angry with me." "All right," said the tiger. And Mr. Mouse-deer went a long way off and stood by a coiled snake. Then the tiger tasted the filth. "Why is it so bitter?", said he: "beast, this is not rice but filth only." And he rushed in a rage to where the Mouse-deer waited. "Now, indeed your hour has come," said the tiger : "make ready to die. But, first, what is this you are guarding," and he looked at the coiled snake. "This is *Nabi Sleyman's* turban," said the Mouse-deer. "May I wear it?", asked the tiger: "of all things I should like to put it on : and if you let me do so, perhaps I may spare your life." "You may put it on," said the Mouse-deer " but first let me go a long way off or *Nabi Sleyman* may be angry with me." "All right," said the tiger. Then the Mouse-deer went a long way off and, looked on gleefully. So, the tiger began to unwind the coils but the snake awoke, his tongue darting like flame, and fought with the tiger and overcame him and killed him. "Ha! ha!", laughed the Mouse-deer and went on his way, up hill and down dale, by jungle and by plain, till he was hungry. Then he came to a cucumber garden and nibbled all the cucumbers. So, the gardener was angry and took paint, dry cocoanut husks and old clouts and made a scarecrow and smeared it with the gutta of the jack-fruit tree. "What is this?" said the Mouse-deer, returning to his feeding ground : " a man, or a doll ? Only a doll, I declare." And he poked it with his foreleg. But his leg struck fast in the gutta. " It's alive, after all, and it wants to fight. I'll kick it hard." Another leg stuck fast. " Oh ! it's only a wretched doll but it has strong glue." And he kicked with his hind legs also, till all four legs were stuck fast. Then the Mouse-deer wept and called for help. And the bird *Ketopok* flew down and offered to release him but warned him it would be a dirty job. " Never mind that," said the Mouse-deer, " so long as I get free." So, the *Ketopok* covered him all over with bird-lime. By and bye, the gardener came up. "Ha!", said he, "here is the thief caught fast. We'll take him home and kill him." Now the Mouse-deer kept still and held his breath. "Don't take him home, father," said the gardener's son, looking at him, "he's been dead some hours and is quite rotten and stinking." And he pulled the Mouse-deer away and threw him on a heap of rubbish. But the Mouse-deer jumped up and shook himself and shouted, "I 'm not dead but dirty." Then he sprang away into the forest.

The Mouse-deer journeyed on, and came to another cucumber garden, and there, too, he nibbled the cucumbers. But the gardener set a trap and caught him and put him in a cage, while the good-wife prepared spices to dress him for a feast. Now, the gardener had an old watch-dog. And the dog went up to the Mouse-deer's cage and asked him why he was locked up. So, the Mouse-deer said, "It is because they would force me to marry the gardener's daughter against my will. See, they are preparing spices for a wedding feast." Then the dog asked, is it not for stealing cucumbers you are imprisoned." But the Mouse-deer persisted it was because he would not marry the gardener's daughter. Then the dog answered, "How long have I done faithful service here, and why should you a stranger be preferred to me. I will take your place and marry." And the dog pushed open the cage and entered it, while the Mouse-deer ran off. By and bye, the gardener came and opened the cage and found only the watch dog; and he cursed and beat the dog: but the dog could only tell, how the Mouse-deer had cheated him.

At last the Mouse-deer came to the sea-shore and met the king of sea-snails, *siput kiyong*, by whom he was worsted. "I pity you;" said he to the snail, "well enough, you can only just crawl with your house and pillow on your back." "Why," said the snail, "I'll beat you in a running race along the sea-shore, if you give me seven days' notice." "Done," said *Si Plandok*, laughing and wondering what the king of the snails would do. But the snail sent messengers to all his *rayats* and bade them assemble in crowds by the edge of the sea, hiding themselves in shallow water, till they saw a Mouse-deer come running, when they were to pop up one after another in front of the Mouse-deer. So, after seven days, the Mouse-deer started to race the sea-snail along the seashore, but fast as he could run, there was always the snail, or so it seemed to him, before him. And Mr. Mouse-deer was angry and discouraged, because he thought the king of the snails had worsted him.

Another Sea-Dyak Legend.*

**vide* Journal Straits Branch R. A. Soc. No. 41. 1904.
"Two Sea-Dyak Legends."

By the Revd. Edwin H. Gomes, M.A.

PULANG-GANA

And how he came to be worshipped as the God of the Earth.

Long, long ago, though the Dyaks knew of paddy and planted it every year, yet they had very poor crops because they did not know who was the god that owned the land, and as they did not offer him sacrifices, he did nothing to help them. In those days there lived together seven brothers and their only sister. Their names were *Bui-Nasi*, *Belang Pinggang*, *Bejit-Manai*, *Bunga-Jawa*, *Litan-Dai*, *Kenyawang*, *and* *Pulang-Gana*, and the sister's name was *Puchong-Kompat*. They lived on a hill by the side of a broad river. On all sides were wide plains, and beyond these were high hills rising in the distance. Most of these were covered with thick jungle; only a few clearings could be seen where paddy had been planted.

Not far from their house the brothers had a garden, in which they planted potatoes, yams, sugar, cane and tapioca; but a porcupine used often to come at night and do much damage to this garden. Their youngest brother *Pulang-Gana* was told to keep watch at night, and drive away the animal or kill it if he could. But all his efforts were vain. When he was awake the animal did not come, but as soon as he fell asleep the porcupine would creep in quietly and eat up the potatoes and yams. The elder brothers were not kind to *Pulang-Gana*. They would not keep watch themselves, but whenever they saw any fresh damage done, then they not only scolded their younger brother but beat him with sticks.

"He is only lazy," they said, "he deserves a thrashing; he does nothing but sleep and is too lazy to wake up at night and drive the porcupine away!"

Poor *Pulang-Gana*! His was a hard lot indeed!

He determined to keep careful watch one night, and whatever it cost him, to kill the porcupine, so that his brothers might have no more cause for blaming him. That night he did not sleep at all. The porcupine came just before dawn when all was very still. *Pulang-Gana* was awake, and went after it, determined to kill it. The animal ran away and *Pulang-Gana* followed. The moon was shining brightly and he had no difficulty in seeing in what direction it went. Every now and then the porcupine stopped, but as soon as *Pulang-Gana* came close to it, it started off again and he was not able to kill it. So the animal went on and *Pulang-Gana* followed. He was determined not to give up the chase until he had killed the animal that had been the cause of his being scolded and beaten so often.

The sun was beginning to rise in the East and still *Pulang-Gana* pursued the porcupine.

"Sooner or later," he said to himself, "I must catch it up. The animal is already tired. I will not return home till I have killed it."

The porcupine now came to the foot of a rocky mountain. *Pulang-Gana* thought the chase would soon be over and he hurried on. But before he could come up to the animal it made its escape into an opening in the solid rock. The cave into which it had disappeared was large enough for a man to stand upright in, and *Pulang-Gana* said to himself:

"Now I have you; wait till I have a light to show me where you are, and then I will come in and kill you."

He collected some dry branches and tied them together for a torch. He found a piece of dry soft wood, and also a short stick of some hard wood the point of which he sharpened. With the palms of his hands he worked the small stick and drilled a hole in the soft wood. Soon it began to smoke, and with the aid of some dry twigs he blew the fire into a blaze; then he lighted his torch, and hurried into the cave after the porcupine.

He saw the animal a little distance ahead of him and followed it leisurely. There was no need for haste, as he would be able to kill it easily enough when he drove it to the end of the cave and it had no means of escape. The cave seemed to extend a great way into the mountain. After a few hours walking *Pulang-Gana* was surprised to come to an opening in the rock through which the porcupine had evidently escaped. Outside the sun was shining brightly. *Pulang-Gana* went through this opening, but though he looked in all directions he could see no signs of the porcupine.

He was uncertain what he ought to do next. The porcupine had escaped and there was no chance of his being able to kill it. He did not feel inclined to return to his brothers because they were all unkind to him. On the other hand, he did not know if this new country in which he found himself was inhabited, and if inhabited, whether the people would treat him kindly. He looked around and saw smoke arising some distance off, and guessed that there was a Dyak house there. As he was hungry he decided to go to it hoping that the inmates would be kind to him and give him food.

As *Pulang-Gana* came nearer he saw that the house was a very long one inhabited by about one hundred families. He stopped at the bottom of the ladder leading up to the house, and following the Dyak custom, asked in a loud voice if he might walk up.

"Yes, come up *Pulang-Gana*," said some one in reply. "We have been expecting you for some time and will be glad to see you."

He was surprised that his name should be known in this strange country in which he had never been before. He walked up and in the long open room stretching the whole length of the house, he saw an old man and a young and beautiful girl.

"Spread out a mat, my daughter," the old man said, "that *Pulang-Gana* may sit and rest after his long journey, and you can prepare some food for him, no doubt he is hungry as well as tired."

She spread out a mat for *Pulang-Gana* and then went into the room to get ready a meal for their visitor. Soon after she opened the door of the room and asked him to come in and eat.

The old man who seemed kind and hospitable said to him:

"Go in and have some food. You must be hungry after your long journey. When you have eaten and rested, we can have a talk together. I have long wished to meet you and to ask you about yourself and your brothers, and how affairs are in your country."

Pulang-Gana went into the room and found a nice meal awaiting him. Being very hungry, he did full justice to it.

That evening as they sat by the fire, the old man asked him about his people and if they had good crops of paddy in his country. *Pualng-Gana* said in reply that though his brothers possessed the largest paddy fields in the country, still he never remembered their having a really good harvest. The paddy they obtained was not sufficient to last them the whole year, and they had to fall back on potatoes and sago for food. The old man seemed interested in what *Pulang-Gana* said of himself, and *Pulang-Gana* want on and told him of all his circumstances, how he lived with his six brothers and only sister and how unkind his brothers were to him. He told the old man also about the porcupine which did such damage to their garden, and how often he had been scolded and beaten by his brothers for not being able to drive away or kill the animal. He gave an account of his adventures that morning, how determining to kill the porcupine, he had followed it through the under-ground passage through the mountain and had found himself in this strange country.

"I have heard your story," said the hold man, "and think you are very much to be pitied. Your brothers seem to have been very unkind and to have treated you very badly. I would like you to stay with me here, and not return to them. I have no son, and would like you to marry my daughter and live with us. I am getting old and am not so strong as I used to be and will be glad of your help."

"I should like to stay with you very much, for you seem so kind, and are so different to my brothers, and I should like to marry your daughter and spend the rest of my life here. But there is no one to look after our garden, and the porcupine will do much damage to it. And my brothers are sure to be angry with me for leaving them, and when they see their garden destroyed through my neglect, they are sure to hunt for me and when they find me they will probably kill me. No; much as I would like to stay, I am afraid I cannot. I must start to return to-morrow. It would have been different if I had succeeded in killing the porcupine, then it would not matter so much if I stayed away some time."

"You need not trouble yourself about the animal that attacks the vegetables planted in your garden. I can prevent its coming again. That porcupine is not really an animal. One of our slaves here, named *Indai-Antok-Genok*, is commanded by me to transform herself into a procupine and pay visits to that garden. I shall tell her to do so no more, and your brothers' garden will be safe enough without you to watch it. You must remain here with us. There is nothing for you to fear. If you do not return your brothers will think that some accident has happened to you and that you are dead. As they are all so unkind to you, you may be sure they will not trouble to look for you."

"Well, if that be the case, I will gladly live with you. I was not happy with my brothers and I am sure I shall be happy here."

So it was decided that *Pulang-Gana* should remain in the house of the old man. Some months afterwards he married the daughter and they lived happily as husband and wife. His wife's father and mother were kind to him and so were the other people in the house, and *Pulang-Gana* was very glad he decided to cast in his lot with them.

Now this old man who treated *Pulang-Gana* so kindly was no ordinary mortal. His name was *Raja Shua* and he ruled the spirits who live in the under-ground caves of the earth. His wife was quite as powerful as he. She was a goddess and had power over the animals of the forest, all of which obeyed her. She was known as *Seregendah.* The daughter that married *Pulang-Gana* was called *Trentom-Tanah-Tumboh* and sometimes *Setanggoi-Tanggoi-Buloh.* It was from his father-in-law and his wife *Seregendah* that *Pulang-Gana* received power over the land.

In process of time *Pulang-Gana's* wife gave birth to a girl, who was very much admired by all, and greatly loved by her parents.

When the child was a few years old, one day she came to her father and mother and asked them what property they intended to leave her. The mother showed her the valuable jars and brassware that she possessed, all of which were to belong to her child. Then the little girl asked her father what he had to give her. *Pulang-Gana* had no property to leave to his daughter. Years ago he had come by chance to this house of *Rajah Shua* bringing nothing with him, and unless his brothers gave him a share of their father's property, he would have nothing to leave his daughter. So he told her to be content with what her mother gave her. She would be very rich without anything from him. But she was not satisfied with this reply, and cried because her father said he had nothing to give her.

When *Pulang-Gana* saw how sad his child was, he said to his father-in-law that he would like to pay a visit to his brothers and ask them for a share of the property, that he might have something to give his daughter. *Rajah Shua* told him he might go to them but warned him that probably he would not have a kind reception, and advised him not to be away long but to return as soon as possible.

Pulang-Gara started on his journey to his old home, wondering how his brothers would receive him after his long absence. He had no difficulty in finding his way as his father-in-law gave him very definite instructions about his journey. He found that his brothers had built a new house not far from the site of the old one in which he had lived with them years ago. The house seemed very quiet and he found that nearly all the people were away on a fishing expedition. Only his sister-in-law, the wife of his brother *Belang Pinggang*, was at home.

She was very much surprised to see him, and said they had given him up for dead long ago. She told him that the others were away fishing, and that his brother *Bui-Nasi*, and a little boy, besides herself, were the only ones left at home. He would find his brother and the little boy working at the forge making some implements for their work.

Pulang-Gana said he would go to his brother and he left the house and walked in the direction where he guessed the forge was from the sound of hammering he heard.

"Oh! Is that you *Pulang-Gana*?" said *Bui-Nasi* as soon as he saw him. "Where have you been all these years? We thought that you had met with some accident and had died long ago."

Pulang-Gana said little about himself to his brother. He told him how he had lost his way in the jungle years ago, and when he arrived at last at a house, the people there persuaded him to stay with them, and he said that he was now married and had a daughter.

"Have you come with your wife to stay with us?" asked *Bui-Nasi.*

"No," was the answer, "I have only come on a short visit by myself to ask for my share of the property left us by our father."

"You have nothing whatever to expect. You left us years ago of your own will and have been away all this time, and now you have the impudence to come and ask for your share of the property. I advise you to say nothing of this to the others. They will be very vexed with you if you do."

"I do not ask for much," said *Pulang-Gana*. "I will be satisfied with little. But my daughter asked me what I had to give her, so I came here to ask for something, and I should be sorry to return empty-handed."

"You shall not return empty-handed," said *Bui-Nasi* in scorn. "Here is something for you to take back with you. If is all that you will get from us, I can tell you." With these words he threw *Pulang-Gana* a clod of earth which he saw lying near. Now go away, and do not let us see your face again."

Pulang-Gana put the lump of earth in his bag, and with a heavy heart, started to return to his house. So this was the way his brothers treated him! There was nothing to expect from them!

When he arrived at his house all the family gathered round him. They had heard that he had gone to ask his brothers for his share of the property and they were anxious to see what he brought back. His little daughter rushed up eagerly to him and said:

"Father what have you brought back for me from my uncles? Let me see the nice things they gave you."

Then *Pulang-Gana* said sadly, "I received no share of the property from your uncles. They would have nothing to do with me, and drove me away."

"But did you get nothing at all from them?" asked his father-in-law.

"Yes," said *Pulang-Gana*, "my brother *Bui-Nasi* did give me something, but I am ashamed to tell you what it is. Here it is," and he took out from his bag the lump of earth his brother had given him, and handed it to his father-in-law.

When *Rajah Shua* saw what it was that *Pulang-Gana* had received from his brothers, he said joyfully:

"They have given you the most valuable gift it is possible to imagine . You are now a person of great importance. The earth is yours. Whoever wishes to plant on it must first make offerings and sacrifices to you and pray to you to give him a good harvest. It is in your power to make the earth fruitful or barren, and to give mankind a good or a bad harvest as you will."

A few months after, the brothers of *Pulang-Gana* at the advice of *Bai-Nasi* decided on the site where they were to plant paddy that year. It was a large forest some distance away from their house First they cut down the smaller trees, and then they felled the large trees, and when all this work was done, they rested for some weeks, waiting for the sun to dry up the timber so that it might be set on fire and the land be ready for planting on.

One day *Pulang-Gana's* father-in-law said to him, "I hear that your brothers have been busy cutting down the trees where they intend to plant paddy this year. As they gave you the earth some time ago to be your share of the property, it is only right that they should ask leave from you before planting on it. Since they have not done so, you must stop them from planting paddy there."

"How can I prevent them planting paddy where they like?" said Pulang-Gana in dismay. "Is it likely that they will take any notice of anything I say?"

"Yes," said his father-in-law, *Raja Shua*, "they will have to listen to what you say, for I will be on your side and will help you. I am the god that rules the spirits that live in the underground caves of the earth, and my wife *Seregendah* has power over the animals and the spirits which inhabit the forests. As your brothers have treated you so unkindly, and have given you no share of the property, and have simply given you a clod of earth to take back with you, my wife and I will punish them and reward you by giving you power over everything that grows on the earth. Before the land is planted upon, offerings must be made to you, and invocations must be made to yourself and myself and my wife *Seregendah.* Unless these things be done, the ground will not be fruitful.

"As your brothers have not done anything of the kind, you must teach them a lesson and prevent them from going on with their work. This evening at dusk you must go to the newly cleared forest and cry aloud: 'Come here all you who are the servants of *Seregendah* and *Raja Shua*,' and name all the wild beasts of the forest. They will come to you in large numbers. Then you must ask them, as well as the invisible spirits, who will be present too, to help you and put up all the trees that have been cut down."

And *Pulang-Gana* did as his father-in-law advised him He went at dusk to the part of the jungle where his brothers had been cutting down the trees and called to the animals in the name of *Rajah Shua* and of *Seregendah*, and they came in large numbers and helped him to put up all the trees that had been felled, and the forest appeared just as it had been before any of the trees had been cut down.

The next day *Bui-Nasi* went early in the morning to see if the fish traps he had set in the stream had caught any fish, and as he was near the part of the forest where the trees had been cut down by his brothers and himself not long before, he went on to see how things were getting on and if the felled jungle was dry enough to be burnt.

To his great surprise he found all the trees standing, and no signs of the clearing that had been made! He hurried home and told his brothers what he had seen, and they all returned, accompanied by their friends and followers, and found that what *Bui-Nasi* had told them was perfectly true. They were all very much surprised as they had never known such a thing happen before.

"I wonder if this is really the part of the forest which we cleared a few weeks ago," said one of the brothers. "Perhaps we have mistaken the spot."

"No," said *Bui-Nasi* in reply, "there is no mistake. Here are the whetstones on which we sharpened our axes and choppers; and here too is where we did our cooking for our mid-day meal."

They held a consultation as to what was to be done.

"This is very strange," said Bui-Nasi. "Some enemy who is helped by powerful spirits is determined not to let us plant paddy here. Let us try and find out who has made the trees that we have cut down stand upright and grow up again as before. My advice is that we cut down the jungle anew, and that some of us remain and keep watch here all night. Perhaps we may be able to catch the culprit."

So the brothers and all their friends and followers set to work, and before the day ended, they had cleared afresh a large stretch of jungle.

Twelve men, with *Bui-Nasi* at their head, were set to watch, and the others returned home, discussing among themselves what had taken place.

Those that were left by the clearing had not long to wait. Soon after dusk they saw a man come and standing on the trunk of a large felled tree, call aloud to the animals of the forest and the invisible spirits around in the name of *Rajah Shua* and *Seregendah* to come to his help. The twelve men crept up cautiously behind him and seized him.

"We have you now," they said as they held him fast. "It is you who have caused us all the trouble of having to cut down this jungle for the second time. Now we intend to kill you, and you will not be able to play your tricks on us any more."

It was too dark to see who it was, and *Bui-Nasi* said, "Let us have a light and see what he is like. I am sure he must be as ugly as he is troublesome."

One of them fetched a light and to their great surprise they saw their prisoner was *Pulang-Gana* !

"So it is you *Pulang-Gana* !" said his brother in anger. "You are up to your old tricks again. You were too lazy to work before, and would not keep watch over our garden, and you left us without telling us where you were going. And now, after several years' absence, you come back and disturb us in our work, and by some means or other set up the trees we have had the trouble of cutting down. Though I am your brother I have no pity for you. As long as you are alive you will give us trouble, so we intend to kill you and be well rid of you."

He expected *Pulang-Gana* to be afraid of him and to plead for his life. But things were very much changed from the old days when *Pulang-Gana* was the despised youngest brother, beaten and scolded by the others. Now he was the son-in-law of the gods, and had *Rajah Shua* and *Seregendah* to help him, and he was not at all afraid of his brothers, because he knew well they could do him no harm.

He shook off those that held him, and told them to listen to what he had to say. His manner and bearing were very different from that of one who feared them. They stood round him in awe, for they instinctively felt that *Pulang-Gana* was not to be trifled with, and from what had already taken place, they knew that he was aided by powerful spirits.

Then *Pulang-Gana* spoke :

"I have good reason for doing what I did. You have no right to cut down this jungle or to plant on this land. You have not paid me the price of the land. Not long ago, you, *Bui-Nasi*, gave me a clod of earth as my share of the property of our father, and so I have now the right of preventing any from planting on the earth. It is no use your attempting to kill me. Though you are many in numbers, it is impossible for you to kill me because I am now the god of the earth, and am assisted by *Rajah Shua* and *Seregendah* whose power you know."

There was silence for a short time, and then *Bai-Nasi* said, "No doubt what you say is true, for no one without supernatural aide have could made the trees that were cut down stand upright and grow. What do you wish us to do in order to obtain your leave to plant on the land?"

Pulang-Gana told them to gather all the people togethe the next day and he would tell them what all must do in order to insure their getting good crops of paddy.

That same night messengers were sent in all directions to tell the people in the neighbouring villages to come together so that *Pulang-Gana* might teach them what they were to do before cutting down the jungle and planting paddy.

The next morning a very large crowd gathered together and *Pulang-Gana* said to them :

"You must, before cutting down the jungle, make invocations to me, as well as to *Rajah Shua* and *Seregendah*, and you must ask me for leave to plant on the piece of land you have decided on, and you must make sacrifices to me of two kinds, some animal—a pig or a fowl—must be killed, and a lso there must be some offering of food-rice, or eggs, or potatoes, or fruit. Then some offering must be taken and buried in the ground to be planted. That is the rent you pay to me for the use of the land that year, for all the land belongs to me and I expect rent to be paid by all who use it.

"And if anything goes wrong in your paddy fields, and the crops are poor, or, being good, are attacked by insects or animals, then you must call upon *Rajah Shua* and *Seregendah* and myself to come to your aid, and we will help you."

And then for the first time did the new ceremonies come into force, and, aided by the higher powers, mankind were able to obtain much better crops than they had done before. And this is why no Dyak dares to plant paddy without first making invocations and offerings to *Pulang-Gana*, *Rajah Shua* and *Seregendah* and also burying some small gift in the earth for the use of the land that year.

Some Notes on Malay Card Games.

R. O. Winstedt.

In preparing these notes, I have used as a ground-work the chapter on card games in Mr. Skeat's *Malay Magic*, but in addition to supplementing that account in some details, I have collated local variations in the rules of the games and collected some terms which I have not seen recorded elsewhere.

I. *Main chabut.* This game, says Mr. Skeat, "is a species of vingt-et-un and is played with either twenty-one or thirty-one points" or pips or *mata* as the Malay idiom is. If the game is thirty-one points, not more than nine people can play: if twenty-one not more than seven. The "ten" cards are not used: according to Mr. Skeat, court cards also are thrown out in the twenty-one game, but I have seen court cards used in both games and counted as ten pips each. The ace (*sat*) is used and is worth one, ten, or eleven pips as is convenient to the player; except that, if you have two aces in one hand while playing the twenty-one game or three in one hand while playing thirty-one, the ace must be reckoned as worth only one pip. The dealer (*perdi*) distributes two *lunas* or 'keel' cards, 'poundation' cards as we might say, to each player. The nicknames for the various combinations in these 'keel' cards given by Mr. Skeat—*lunas nikah*, a court card and an ace; *lunas dua jalor*, two threes; *kachang di-rendang di-tugalkan*, two aces—I have found to be familiar even to the younger generation in Perak. After the 'keel' cards have been dealt, each player in turn draws (*chabut*) fresh cards from the bottom of the remaining cards of the pack. Whoever gets thirty-one or twenty-one pips exactly, according as to which game is being played, is said to "*masok mata.*" In a game of thirty-one, no player can *chabut* more than seven cards or more than five in a twenty-one game, and if he has drawn seven or five cards and not yet got nor exceeded thirty-one (or twenty-one) pips, he is said to *masok daun* and wins even over a player who has *masok mata.* Of those who *masok daun*, the one with the smaller number of pips would win: but for two players to hold such a hand hardly ever occurs. The player who gets more than thirty-one (or twenty-one) points is said to be "dead" *mati*, or "blind" *bota*, or "to go to pot" *masok pering*, literally 'enter the plate,' alluding to the plate in the centre of the players into which he will fling his hand. When a player has drawn cards, till he has a total of twenty-six, twenty-seven or twenty-eight (or sixteen, seventeen, eighteen) points in his hand and is afraid to draw another card for fear of exceeding thirty-one (or twenty-one), he is said to be "in a small coil," *blit kechil*, and "passes," if this happens, when he has twenty nine or thirty pips, it is *blit besar.*

"When two players have the same number of pips. e.g., nine and nine or eight and eight—," writes Mr. Skeat, "the coincidence is described in the words, *Jumpa di-jalan, diadu kalah, dichabut mati.*" This is not very intelligible. I believe, it should be explained as follows. If I have passed with twenty-nine or twenty-eight pips in my hand and another player after me does the same, it is a rule of the game that I (who first had twenty-nine pips in my hand) win before him. So, the phrase applies to the loser. If he had drawn another card, he would probably have become *mati*, holding more than thirty-one points: reluctant to draw another, he cannot *adu* or compete with the man who was *blit* first with the same number of pips as he.

Kena ranjau, translated by Mr. Skeat "to be bluffed," I take to be the same as *kena das.* (Singapore) and to apply to a player who inadvertently or foolishly shows his hand, *buka daun*, before the rest of the players are all *blit* or *mati* or *masok mata*, and so has to pay up all round by way of penalty.

II. *Daun tiga' lei or pakau.* Three cards are dealt to each player. The best hands are called *daun trus.* In Perak and Selangor, the very best hand is three aces: the next best in Perak is three court cards, in Selangor three threes. Then follow in Perak, hands of nine and eight pips; in Selangor, says Mr. Skeat, hands of three tens, and three court-cards in that order and then hands of nine, eight, seven pips and so on in descending order of value. "The highest hand counting by pips," Sir William Maxwell puts it clearly, "is that which contains the greatest number of pips after the tens are deducted." In Perak, "a hand of three threes is really a good hand, being nine, but it is considered a propitiation of good luck to throw it down (without exposing it) and announce that one is *bota* in hopes of getting good luck afterwards."

Apparently, Singapore players recognize a different list of *daun trus.* The best hand is three court-cards, *tiga kuda*: the next best is three threes or a nine and two court cards. And then follow hands of nine, eight pips and so on in descending scale. The tens are not used at all. Court cards are valued at zero, except when you have three in one hand and so hold the best possible of *daun trus.* Three aces are reckoned as three pips only: so, a hand of three aces is absolutely worthless, and a hand of two aces and a court card, for instance, makes you only two pips. If you hold one court card, one ace and one nine, the ace is counted as zero like a court-card and you score nine: so, this hand is one of the *daun trus*, equivalent to two court cards and a nine.

Then there are the phrases, *handak kaki tiga*, *minta penoh*, *minta isi*, *minta kosong*, used in the process, *mengurut daun.* "A player does not hastily, look at his three cards and learn his fate at once," says Sir William Maxwell, "but he prolongs the excitement by holding his cards tight together, and looking alternately at the outside ones, and last of all at the middle one, sliding out the latter between the two others little by little. Thus it is left uncertain for some time whether a card is an eight or a seven, a nine or a ten." *Handak kaki tiga* is a player for a six, seven or eight cards having pips in rows of three. If after seeing my top and bottom cards I want the remaining card to have no pip in the centre; if, for example, I want a six and not a seven or eight, I am said to *minta kosong:* if, on the contrary, I want a pip or pips in the middle of the third card, want a seven or an eight, I am said to *minta isi*, or *minta penoh.* Many players make a clicking sound like one encouraging a horse, if they want a *kuda* or court card.

Main trop. The following are some terms in connection with this game which I have failed to find either in Skeat or in Wilkinson's Dictionary.

In *main trup*, when a player leads a trump card, his action is described by the words *sudi* or *jaru.* Diamonds are sometimes called *batu Malacca* or *dobin* (or *jubin* : Jav.=square flag-stones) spades, *payong. Bibi* is used of the Queen. If I and my partner have already got seven tricks between us, I ask him *kiler-kah atau kot-kah :* should he hold no more cards of value in his hand, he says *kiler* and the game is over ; should he hold high cards and thinks we can take all the tricks, he says *kot* and we play on in the hope that our opponents may *kena kot*, not score a single trick ; but, if any of our tricks are lost, the tables are turned and we ourselves *kena kot balik. Mita sus* is to ask for special cards from one's partner. There are numerous masonic signs accounted by Malay gamblers proper and clever, but which we should call cheating. Thus, to open one's hand of cards fanshape like opening an umbrella is to call for *payong*, spades : brush the edge of your cards along the table and you ask for diamonds, because thus the *batu Malacca* is cut : lift your cards quickly and you ask for the card with the *flying* animal, *klawer :* want hearts and you describe on the table a circular movement with your hand of cards. Of course, you and your partner must be accomplices and your sleights pat and deft.

Main daun cheki. The following is a complete list of the names of these cards as given me :—*iyu merah besar. iyu merah sa'krat, iyu kuching, iyu kasut, iyu budak, iyu panjang : kau merah, kau jalan, kau kurap : sah waji, sah burong, sah halus : si lebai, si trubu, si pinggang : chek laier, chek burong, chek halus : lah tali, lah krang, lah halus : peh pichak kapala, peh krang, peh pinggang* (or *tali*) *: go babi, go tongkang, go pending : ji gendang, ji pentil, ji bengkok* or *burong. Cho it* and *chochot* are names of two species of *main cheki.*

A List of the Butterflies of Borneo, and Nymphalinae.

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Part II.

Sub-Fam-Nymphalinae.

Genus *Ergolis.*

102. *Ergolis ariadne*, Joh.

Papilio ariadne, Johannsen, Amæn. Acad. vi. p. 407 (1764).

The typical form occurs in the Indian region, Siam, Malay Peninsula, Java, Borneo, the Lesser Sunda Is., Sumbawa Flores and Alor ; there are three sub-species occurring in Ceylon, Yunnan and Timor respectively.

103. *Ergolis specularia*, Fruhst.

Ergolis specularia, Fruhstorfer. Berl. ent. Zeitsch. Bd. XLIV p. 91 (1899).

In West-Java, South-Borneo and a sub-species in Alor and Sumbawa.

Messrs Pryer and Cator in the British North Borneo Herald Oct. 1894 pp. 259 and 260 describe two species of *Ergolis* as *Ergolis ahmat* and *Ergolis* telok, their descriptions are so brief and incomplete as to be quite useless for purposes of identification, and as the types of the species are now lost it would be as well to lose sight of the barbarous names as well. *E. ahmat* may possibly be a form of *E. merione* Cr.

Genus *Eurytela.*

104. *Eurytela castelnaui*, Feld.

Eurytela castelnaui, Felder. Wien. Ent Monats. iv. p. 401 (1860).

Occurs also in Tenasserim, Malay Peninsula, Sumatra, Palawan with a sub-species in Nias.

The species is extremely rare in S. W. Borneo and Sarawak, though fairly common in British N. Borneo.

Genus *Euripus.*

105. *Euripus halitherses*, Doubl. and Hew.

Euripus halitherses, Doubleday and Hewitson Gen. D. Lep. vol. ii p. 293 pl. 41 fig. 2 (1848).

Sub-sp. *E. halitherses borneensis*, Dist.

The typical form occurs in India, Assam and Burma, the sub-species *borneensis* is confined to Borneo, other sub-species occur in the Malay Peninsula, Sumatra, Java, Nias, Palawan and the Philippines. The different forms of the polymorphic female of this species have been given a great variety of names and the result is that the relationships between the different forms and between topomorphic varieties are much obscured. I believe that three fairly distinct female forms and three only can be recognised, viz. :—

1. A form mimicking both sexes of the species of the subgenus *Danisepa*, to which the name *isa*, Moore may be applied ; *alcatheoides*, de Nias *danisepa*. Fruhst, *pfeifferoides*. Fruhst. etc., are merely more or less well-marked varieties of this form ; in Borneo or elsewhere this form is highly variable and no two specimens exhibit identically the same markings.
2. A form mimicking a *Euplœa* such as *Penoa uniformis*, to which the name *uniformis*, Fruhst. may be applied ;

the specimen figured by Moore in his Lepidoptera Indica. Plate 204 fig. 1, 1 a may be considered a typical example of this form.

3. A form mimicking species of the sub-genus *Trepsichrois*; the *nyctelius* of Doubleday and the *cinnamomens* of Wood-Major.

Form No. 2 seems to be intermediate between *isa* and *nyctelius* and I am sure that if a large number of these polymorphic females could be collected from a very wide area a graduated series between extreme forms of *isa* and of *nyctelius* could be constructed, unfortunately the females of this species are very rare and it will be long before this ideal can be attained; in the meantime to recognise in the distributional area of the species merely three female forms with distinctive names or numbers appears to be less confusing than to name indiscriminately every topomorph differing from closely related topomorphs in most trifling details.

Genus *Cupha*.

106. *Cupha crymanthis*, Drury.

Papilio crymanthis, Drury, Illust. Exot. Ent. i. pl. 15 fig. 3 and 4 (1770).

Sub-sp. *C. crymanthis lotis*, Sulz.

The species has a very extended distribution ranging from India and China to Celebes, Ké and Amboina and to the Philippines. The typical form is restricted to China, Formosa and Hainau.

107. *Cupha arias*, Feld.

Messaras arias, Felder, Reio. Nov. Lep. iii. p. 391 (1867).

In Mantanani Is. off the coast of N. Borneo, in Palawan and the Philippines; a sub-species occurs in Celebes.

Genus *Atella.*

108. *Atella alcippe*, Cr.

Papilio alcippe, Cramer. Pap. Exot. iv. pl. 389 fig. 9 H. (1782).

Sub-sp. *A. alcippe alcippoides*, Moore.

The typical form is confined to the Moluccas ; *alcippoides* occurs in Sikkinm, Silhet, Khasia, S. India, Burma, Tenasserim, Andamans, Malay Peninsula, Borneo, Sumatra, Java ; other sub-species are found in the Nicobars, Philippines Palawan and Celebes.

109. *Atella sinha*, Kollar.

Terinos sinha, Kollar, Hügel's Reis. Kasch. iv. pt. 2, p. 438 (1844).

Occurs in India, Burma, Assam, Tenasserim, Malay Peninsula, Great Sunda Is., Philippines, Celebes.

Genus *Cethosia.*

110. *Cethosia hypsea*, Doubl.

Cethosia hypsea, Doubleday and Hewitson, Gen. D. Lep. pl. 20 f. 4 (1847).

The typical form is confined to Borneo, but sub-species are found in the Malay Peninsula, Sumatra, Java, Billiton, Palawan, Balabac, and the Philippines.

[The larva has the dorsal half of the body red, the ventral half black, with the exception of the seventh segment which is entirely creamy white. Like many other members of the genus the larva is gregarious ; it bears a close resemblance to the larva of a day-flying moth *Hypsa sp.* which is also gregarious. Mr. H. N. Ridley, Director of the Singapore Botanic Gardens found a number of the Hypsid larvæ grouped closely and symmetrically around the end of a flower-stalk, the group looking like a large conspicuous fruit. The pupa of *Cethosia hypsea* is at first pure white with a few brown and yellow blotches, but it gradually becomes a pale brown. The adult is one of the commonest butterflies in Borneo and I have no doubt that it is a very distasteful species ; when on the wing it is not at all unlike the widespread *Limnas chrysippus* and it may be considered as an "incipient mimic" of that species.]

111. *Cethosia biblis*, Drury.

Papilio biblis, Drury, 111 Exot. Ent. I Pl. 4. f. 2 (1773).

Sub-sp. *C. biblis Sandakana*, Fruhst.

The species occurs in Sikkim, Assam, Burma, Tenasserim, Indo-China, Nicobars, Andamans, Malay Peninsula, Java, Borneo, Philippines, Moluccas. The sub-species *sandakana* is confined to N. Borneo.

Genus *Terinos*.

112. *Terinos clarissa*, Boisd.

Terinos clarissa, Boisdewal, Spèc. Gen. Lep. i. pl. 9, fig. 4 (1836).

Occurs in Upper Tenasserim, Malay Peninsula, Singapore, Borneo, Java.

113. *Terinos fulminans*, Butl.

Terinos fulminans, Butler, Cist. Ent. i. p. 9 (1869).

Confined to Borneo.

114. *Terinos tenthras*, Hew.

Terinos tenthras, Hewitson, P. Z. S. 1862 p. 89.

There is a specimen of this species in the Sarawak Museum from Simanggang, Batang Lupar River. Sarawak and this constitutes the first record of the species occurring in Borneo; it is also found in the Malay Peninsula and Singapore.

Terinos terpander, Hew. (*syu. T. nympha*, Wall.) seems to have been wrongly recorded from Borneo, the species is confined to Sumatra.

Genus *Cynthia*.

115. ***Cynthia erota***, Fab.

Papilio erota, *Fabricius*, Ent. Syst. III. 1 p. 76 (1793)

Sub-sp. *C. erota erotella*, Butl.

This sub-species is found in the Malay Peninsula, Borneo, Natunas, Banka and Billiton; a female from Mr. Kina Balu is distinguished by Fruhstorfer as an aberration to which he gives the name *montana*. The exact range of the species is rather uncertain, but if Fruhstorfer's grouping of the various forms is correct (Iris 1899 p. 84) the species range from the Indian region to the Philippines and to Celebes and the Moluccas.

Genus *Eulaceura*.

116. ***Eulaceura osteria***, Westw.

Apatura osteria, Westwood, Gen. D. Lep. p. 305 (1850).

From Tenasserim, Malay Peninsula, Singapore, Java, Borneo.

Genus *Herona*.

117. ***Herona Schönbergi***, Staud.

Herona schönbergi, Staudinger, Iris. 1890 p. 337, pl. 3 f. 3.

Confined to Borneo.

Genus *Precis.*

118. *Precis iphita*, Cr.

Papilio iphita, Cramer, Pap. Exot. III t. 209. C. D. (1782).

Precis neglecta, Swinhoe, A. M. N. H. (7) vol. 3. p. 103 (1899).

Sub-sp. *P. iphitat osca*, Fruhst.

This sub-species is restricted to Sumatra and Borneo other forms are found in China, India, Burma, Java, lesser Sunda Is. Malay Peninsula, Palawan.

The splitting up of this and other species of the genus into sub-species cannot be regarded as altogether satisfactory. The wonderful results obtained by G. A. K. Marshall (of Trans. Ent. Soc. Lond.) from his breeding experiments with African species of *Precis* afford convincing proof of the extraordinary plasticity of the species of this genus and until similar experiments are conducted with the Indo-Malayan species we can have no worthy evidence of the constancy of the sub-specific or geographical forms distinguished by Fruhstorfer (Berl. Ent. Zeitsch. XLV p. 22. 1900).

Precis neglecta Swinhœ appear to be nothing but an aberration or seasonal phase of *P. iphita* and in our present state of ignorance I have no hesitation in sinking the name as a synonym.

119. *Precis hedonia*, L.

Papilio hedonia, Linnaeus, Mus. Olr. p. 279 (1764).

Sub-sp. P. hedonia ida Cr.

This form occurs in the Malay Peninsula, Great and Lesser Sunda Is. Philippines, Palawan, Sumba, Flores. Other forms occur in Celebes, Moluccas, New Guinea and Australia.

Genus *Junonia.*

120. *Junonia atlites*, L.

Papilio atlites, Linnaeus, Cat. Ms. p. 24 (1763).

Indian region, Nicobars, Malay Peninsula, Hainan Great Sunda Is., Nias.

121. *Junonia almana*, L.

Papilio almana, Linnaeus, Syst. Nat. x. ed. p. 472 (1758).

From Indian region, Andamans and Nicobars, Malay Peninsula, China, Formosa, Japan, Philippines Great Sunda Is. and Lesser Sunda Is.

The wet season form *J. asterei*, L. alone occurs in Borneo where it is extremely rare, Pryer and Cator record one specimen from N. Borneo.

122. *Junonia orithya*, L.

Papilio orithya, Linnaeus, Syst. Nat. ed. x. p. 473 (1758).

Sub-sp. *J. orithya wallacei*, Dist.

The species ranges from India and China right down to Australia. Fruhstorfer recognizes nine geographical races.

GENUS NEPTIS.

Sect. *Rahinda.*

123. *Neptis hordonia*, Stdl.

Papilio hordonia, Stdl, Cramer's Pap. Exot. V pl. 33, pig. 4. 4. D (1791).

Occurs in India, Assam, Burma, Tenasserim, Siam, Malay Peninsula and the Sunda Is.

124. *Neptis dindinga*, Butl.

Neptis dindinga, Butler, Trans. Linn, Soc. (II) i. p. 542, pl. 68, fg. 6. (1879).

From Burma, Tenasserim, Malay Peninsula, Borneo.

125. *Neptis paraka*, Butl.

Neptis paraka, Butler, Trans. Linn. Soc. (II) i. p. 542, pl 68, fig. 2. (1879).

From Assam, Burma, Tenasserim, Malay Peninsula, Great Sunda ls, Nias and Mergui Archipelago.

126. *Neptis aurelia*, Staud.

Neptis aurelia, Staudinger, Exot. Schmett. p. 145 (1886).

From Burma, Tenasserim, Malay Peninsula, Borneo, Sumatra.

127. *Neptis Sandaka*, Butl.

Rahinda Sandaka, Butler. P. Z. S. 1892, p. 120.

Confined to Borneo.

This may be merely an aberration of *N. paraka*, Butl.

Sect. *Lasippa.*

128. *Neptis heliodore*, Fab.

Papilio heliodore, Fabricius, Ent. Syst. III. i. p. 130 (1793).

Occurs in Lower Burma, Tenasserim, Siam, Malay Peninsula, Sumatra, Java, Borneo.

The males of this species are extremely rare.

129. *Neptis siaka*, Moore.

Neptis siaka, Moore, Trans. Ent. Soc. Lond. 1881 p. 311.

From Sumatra, Nias and Borneo.

Sect. *Stabrobates.*

130. *Neptis miah*, Moore.

Neptis miah, Moore, Cat. Lep. Mus. E.I.C. i. p. 164, pl. 4a fig. 1 (1857).

Subsp. *N. miah batara*, Moore.

The species occurs in India, China, Burma, Siam, Malay Peninsula, and the great Sunda Is. The sub-species *batara* occurs in the Malay Peninsula, Sumatra and Borneo.

Sect. *Bimbisara.*

131. *Neptis harita*, Moore.

Neptis harita, Moore, P. Z. S. 1874, p. 571 pl. 66. f. 8.

Occurs in India, Assam, Burma, Tenasserim, Malay Peninsula, Borneo.

This may be only a sub-species of *N. vikasi*, Horst.

132. *Neptis anjana*, Moore.

Neptis anjana, Moore, Trans. Ent. Soc. 1881, p. 309.

Occurs in Burma, Tenasserim, Malay Peninsula, Sumatra, Borneo, Nias.

133. *Neptis omeroda*, Moore.

Neptis omeroda Moore, P. Z. S. 1874 p. 571.

Occurs in Penang, Singapore, Sumatra, Borneo.

The species appears to be extremely closely allied to *N. harita* and *N. vikasi.*

Sect. *Pardassana.*

134. *Neptis fuliginosa*, Moore.

Neptis fuliginosa, Moore, Trans. Ent. Soc. Lond. 1881. p. 31.

Occurs in Lower Burma, Tenasserim, Sumatra and Borneo.

135. *Neptis leucothoë*, L.

Papilio leucothoë Linnæus, Mus. Ubr. p. 292 (1764).

Subsp. *N. leucothoë matuta*, Hübn.

The following table must be regarded merely as a provisional arrangement :—

Neptis leucothoë L. forma typica—China, Formosa.
,, ,, astola, Moore. Himalayas, Khasias, U. Burma.
,, ,, varmona, Moore. India, Sikkim, Ceylon.
,, ,, andamana, Moore. Andamans.
,, ,, nicobarica, Moore. Nicobars.
,, ,, adara, Moore. Burma, Tenasserim, Malay Peninsula, Sumatra.
,, ,, matuta, Hübn. Java, Borneo.

136. *Neptis susruta*, Moore.

Neptis susruta, Moore, P. Z. S. 1872, p. 563, pl. 32, fig. 4.

India, Sikkim, Burma, Tenasserim, Malay Peninsula, Sumatra, Borneo.

137. *Neptis nata*, Moore.

Neptis nata, Moore, Cat. Lep. Mus. E. I. C. i. p. 168, pl. 4a, fig. 6 (1857).

From Burma, Tenasserim, Malay Peninsula, Nias and the Great Sunda Is.

Messrs. Pryer and Cator describe a species of *Neptis* as *Neptis fulva* (British N. Borneo Herald p. 260 1894); Moore regards this as a synonym of *Neptis nata* (Lep. Ind. vol. iii. p. 243) *Neptis Kechil* Pryer and Cator is probably an aberration of the same species , the description is hopelessly inadequate and the type of the species is lost.

Sect. *Andrapana.*

138. *Neptis duryodana*, Moore.

Neptis duryodana, Moore, P. Z. S. 1858, p. 10, pl.49, fig. 8.

From Borneo and Sumatra with possibly some subspecies in Java and the Malay Peninsula.

Moore gives *Neptis basalla,* Pryer and Cator as a synonym.

Genus *Cirrochroa.*

139. *Cirrochroa bajadeta*, Moore.

Cirrochroa bajadeta, Moore, Cat. Lep. Mus. E. I. C. i. p. 150, pl. 3a fig. 3, 3a (185).

Cirrochroa ravana, Moore. l. c. p. 150 (185).

Occurs in the Malay Peninsula, Java and Borneo.

[A wonderful flight of this species occurred at Kuching and Sadong, Sarawak on the 12th of January 1903 ; a short account of it was published in this journal No. 39 p. 203].

340. *Cirrochroa mithila*, Moore.

Cirrochroa mithila, Moore, P. Z. S. 1872 p. 558.

Subsp. *C. mithila rotundata*, Butl.

Occurs in Sikkim, Assam, Bengal, Tenasserim, Burma, Malay Peninsula and Great Sunda ls. *Rotundata* differs from the typical form in being more heavily marked especially at the apex of the forewing above, in Bornean males the discal fascia on the underside is narrower, and in the females it is rather differently shaped and on the hind-wing narrower than in the Indian forms. It is quite possible that the Bornean race is sub-specifically distinct from the other Malayan races, in which case it will require another name.

141. *Cirrochroa calypso*, Wall.

Cirrochroa calypso, Wallace, Trans. Ent. Soc. Lond. 1869 5 p. 339.

The species is confined to Borneo.

142. *Cirrochroa malaya*, Feld.

Cirrochroa malaya, Felder, Wien. Ent. Monats. iv. p. 399 (1860).

Sub-sp. *C. malaya baluna*, Fruhst.

From the Malay Peninsula, Sumatra and Borneo ; the Natunas Is. race is distinguished as *natuna* Fruhst.

143. *Cirrochroa satellitia*, Butl.

Cirrochroa satellitia, Butler, Astula Entom. i. p. 9. (1869).

Hong-kong, Malay Peninsula, Borneo.

144. *Cirrochroa orissa*, Feld.

Cirrochroa orissa, Felder, Wien. Ent. Monats. iv. p. 399 (1860).

From the Malay Peninsula, Sumatra and Borneo.

[In Borneo at any rate this is a characteristically mountain species.]

Genus *Dugapa*.

145. *Ducapa fasciata*, Feld.

Atella fasciata, Felder, Wien. Ent. Monats. iv. p. 236 (1860).

From Tenasserim, Malay Peninsula and Great Sunda Is. Philippines, Palawan.

Genus *Stibochiana.*

146. *Stibochiona schönbergi*, Honr.

Stibochiona schönbergi, Honrath, Berl. Ent. Zent. 1889, p. 165, pl. 2, fig. 4.

Stibochiona persephone, Staudinger, Iris, 1892, p. 451.

From Mr. Kina Balu and Matang, Borneo.

Genus *Hypolimnas.*

147. *Hypolimnas bolina*, L.

Papilio bolina, Linnæus, Syst. Nat. x. ed. p. 479 (1758).

Ranges through the Indian region and China, the Malay Peninsula and the Philippines, through the Malay Archipelago and Australia and the South Sea Islands. The females are extraordinarily variable and it does not seem possible as yet to divide them up into constant local races. The female form most frequently met with in N. Borneo is dark fuscous above with a subapical blue-white fascia on the forewings, one specimen from N. Borneo in the Sarawak Museum however, has a tinge of red near the exterior angle of the forewing, whilst a specimens from Kuching has a large red patch near the external angle of the forewing and a discal white patch on the hind-wing. The species is rare in Sarawak, though quite common in N. Borneo.

148. *Hypolimnas misippus*, L.

Papilio misippus, Linnæus, Mus. Ubr. p. 264 (1764)

Africa, India to Malay Peninsula, China and Formosa Great and Lesser Sunda Is.

I have not yet met with the species in Sarawak.

149. *Hypolimnas anomala*, Wall.

Diadema anomala, Wallace, Trans. Ent. Soc. Lond. 1869, p. 285.

Malay Peninsula, Great Sunda Is. Nias, Amboina, Philippines.

[The female is a close mimic of *Euplœa clandius mulciber* ♂, some males have also a blue gloss on the forewings and then mimic *E. clandius mulciber* ♂, others have no blue gloss and mimic *Euplœa crameri*. The species has the flaunting flight so typical of the Danainæ. It seems very likely that this wide-spread genus is a protected one and that the mimicry of Danaines by the various species is Müllerian mimicry as opposed to Batesian.]

Genus *Dichorragai.*

150. *Dichorragia nesimachus*, Boisd.

Adolias nesimachus, Boisduval, Cur. Rég. Anim. ms. ii. pl. 139, bis, fig. 1 (1836).

Sub-sp. *D. nesimachus mannus*, Fruhst.

The typical form occurs in India, Burma, Malay Peninsula, the sub-species *mannus* in Java, Sumatra and Borneo and a third form in Celebes.

Genus *Parthenos.*

151. *Parthenos sylvia*, Cr.

Papilio sylvia, Cramer, Pap. Exot. i. pl. 43 figs. F. G. (1776).

Sub-sp. *P. sylvia borneensis* Staud (*nella* Suruh. *syn.*)

This sub-species is confined to Borneo. Fruhstorfer divides the species into no less than twenty-four local races ranging through India to China and the Philippines and down the Malay Archipelago to New Guinea.

Genus *Lebadea*.

152. *Lebadea martha*, Fab.

Papilio martha, Fabricius Mant. Ins. ii. p. 56 (1787).

The Sarawak Museum collection contains a male of this species from Satap, Sarawak which is quite indistinguishable from Burmese males of the wet-season brood. Fruhstorfer divides the species into eight races with one aberration from Burma, Assam, Sikkim, Indo-China, Malay Peninsula, Natunas, Great Sunda Is., and Palawan. *Lebadea martha paduka*, Moore from Borneo I prefer however to regard as a distinct species, in spite of the fact that the Malay Peninsula race serves partly to bridge the gap between it and the typical form from Burma etc.; the occurrence side by side in a limited area of two sub-species appears to me quite incredible.

153. *Lebadea paduka*, Moore.

Limenitis paduka, Moore, Cat. Lep. Mus. E.I.C., i. p. 179 (1857).

Borneo and Palawan (? only).

Genus *Pandita*.

154. *Pandita sinope*, Moore.

Pandita sinope, Moore, Cat. Lep. Mus. E.I.C., i. p. 181 pl. 6a, fig. 3 (1857).

Sub-sp. *P. sinope sinoria*, Feld.

This sub-species occurs in Borneo, others in Malay Peninsula, Java, Sumatra, Billiton, Banca, Nias.

Genus *Limenitis*.

155. *Limenitis procris*, Cr.

Papilio procris, Cramer. Pap. Exot. ii. pl. 106, fig. E. F. (1777).

Sub-sp. *L. procris agnata*, Fruhst.

The species occurs in India, Ceylon, Burma, S. Andamans, Malay Peninsula, Great and Lesser Sunda Is. Flores and Palawan; the sub-species *agnata* is confined to the Malay Peninsula, Sumatra and Borneo.

156. *Limenitis daraxa*, D. and H.

Limenitis daraxa, Doubleday and Hewitson, Gen. D. Lep. ii. p. 276 pl. 34. fig. 4. (1850).

Sub-sp. *L. daraxa viridicans*, Fruhst.

India, Assam, Burma, Tenasserim, Malay Peninsula and Borneo.

The sub-species *viridicans* is only found on the mountains of Borneo.

Genus *Athyma*.

157. *Athyma larymna*, D. and H.

Limenitis larymna, Doubleday and Hewitson, Gen. D. Lep ii. pl. 35, fig. 1. (1850).

Sub-sp. *A. larymna elisa* Fruhst.

The sub-species is found in Borneo, Malacca, Tenasserim and Sumatra, other races in Java, Palawan and Nias.

158. *Athyma idita*, Moore.

Athyma idita, Moore, P. Z. S. 1858, p. 16, pl. 51, fig. 3.

From the Mergui Archipelago, Malay Peninsula and Great Sunda Is.

159. *Athyma kanwa*, Moore.

Athyma kanwa, Moore, P. Z. S. 1858, p. 17. pl. 51, fig. 2.

From Burma, Assam, Malay Peninsula, Sumatra, Nias, Borneo.

160. *Athyma pravara*, Moore.

Athyma pravara, Moore, Cat. Lep. Mus. E. I. C. i. p. 173 pl. 50, fig. 4 (1857).

From Assam, Burma, Tenasserim, Malay Peninsula, Great Sunda Is. Banca Nias.

161. *Athyma kresna*, Moore.

Athyma kresna, Moore, P. Z. S. 1858, p. 12. pl. 50, fig. 4.
Athyma subrata, Moore, l. c. p. 13, pl. 51, fig. 1.

Occurs in India to the Malay Peninsula, Mergui Archipelago, Sumatra and Borneo.

Fruhstorfer regards *A. subrata.* Moore as a local race of *A. nefte*, Cr. but this is certainly not so ; *A. subrata* is the female of *A. kresna.* [The female is a close mimic of *Neptis harita*, Moore ; it is extremely rare].

162 *Athyma nefte*, Cr.

Papilio nefte, Cramer, Pap. Exot. iii. pl. 256, fig. E F, (1782).

Sub-sp. *A. nefte nivifera*, Butl.

The typical form is confined to Java, the sub-species is found in Tenasserim, the Malay Peninsula, S. Borneo, Java, Sumatra.

163. *Athyma ambara*, Druce.

Athyma ambara, Druce. P. Z. S. 1873, p. 344, pl. 32 fig. 2.

The typical form is confined to Borneo ; there is a sub-species *ambarina* in the Malay Peninsula and Sumatra.

164. *Athyma cama*, Moore.

Athyma cama, Moore, Cat. Lep. Mus. E. I. C. i. p. 174, pl. 5a. fig. 5. (1857).

Sub-sp. A. *cama ambra*, Staud.

The typical form occurs in India (Himalayas) Assam, Burma, the sub-species on Mr. Kina Balu, N. Borneo.

165. *Athyma abiasa*, Moore.

Athyma abiasa, Moore, P. Z. S. 1858, p. 16, pl. 50, fig. 7.

Occurs in Malay Peninsula, Mergui Archipelago, Nias and Great Sunda Is.

The species is very variable in size and in markings: mountain specimens in Borneo are considerably larger as a general rule than low country forms, but there appear to be no other characters of the least constancy to justify a separation of the species into two distinct races.

166. *Athyma euloca*, Sp. n.

♂ *Upperside*: Dark fuscous with the following markings:—on the *forewings*, a short narrow line in the cell, a triangular spot at the end of the cell, three subapical spots placed obliquely outwards, two discal spots, the upper large and situated in the second median interspace, the lower small and devided by the sub-median nervure, a sub-marginal series of six small spots, white; a powdering of green scales at base of cell and between the discoidal streak and outer tringular spot; on the *hindwings* the discal band is much reduced consisting of two white spots and of a greenish grey suffusion in the sub-median interspace, there is a double sub-marginal series of spots which become obsolete towards the external angle of the wing, the inner spots are pale fuscous, the outer are pale fuscous but becoming greenish and larger towards the anal angle. The dorsum of the first abdominal segment is covered with greenish-grey hairs.

Underside. Olive, brown; on the *forewings* the markings are much the same as on the upperside, but the cell has a whitish streak closing it and two transverse brown lines between the discowal streak and outer spot; the sub-marginal series of spots is indistinctly doubled and suffused slightly with violaceous; on the *hind-wings* the abdominal margin and greenish, there is a whitish mark below the pre-costal nervure, the discal band is still more reduced than on the upperside, the inner sub-marginal series is whitish and with internervular obsolete dashes, brown in colour passing from it inwards, the outer series is violaceous.

Body and legs beneath greenish.

Expanse, 51 mm. *Hab.* Mt. Matang, 3200,' Sarawak (June). Type and only known specimen in the Sarawak Museum. The species is remarkable for the great reduction of the white markings on the upperside.

[A little detail in the markings on the upperside of species of the genus *Athymae* seems to have hitherto escaped notice. In nearly all the species—*A. sclenophora*, Koll. and *A. zeroco*, Moore are exceptions,—the transverse discal white band of one hind-wing is continuous with the corresponding band of the other wing by means of a patch of white hair covering the dorsum of the first abdominal segment; in the males of *A. sclenophora* and *A. zeroca* the discal bands are broader and are more oblique and so touch the abdominal margin of the wing at a lower level than they do in such a species as *A. kresna*, Moore, and we find that the band of one wing is not connected through an abdominal tuft of white hair with the other band; in these details of markings at any rate these two species approach the genus Limenitis but it is interesting to note that the females have these discal bands more transverse and connected one with the other across the abdomen in the manner so characteristic of other *athymae*. The species of the genus *Neptis* which serve as models to so many mimicking Athymae in no case known to me have the discal bands of the hind-wings connected by an abdominal patch, even though these bands in many species are quite as transverse as in characteristic *Athymae.* The presence of a tuft of white hairs on the dorsum of the first abdominal segment, forming a connection between the discal band one of hind-wing and that of the other wing is then quite an important character of the genus Athymac, it is present in a modified from in *A. euloca,* milsi. in correlation with the obsolescent discal bands of that species].

Genus *Adolias.*

167. *Adolias dirtea,* Fab.

Papilio dirtea, Fabricius, Ent. Syst. iii. pt. 1, p. 59 (1793).

The typical form occurs in the Indian region, Malay Peninsula, Sumatra, Borneo, Natunas, Banka and Billiton, sub-species occur in Indo-China, Hainan, Assam, Sikkim, Java and Philippines. Fruhstorfer names a form occurring on mountains in Sumatra and Borneo :—ab. *montana,* Hagen.

168. *Adolias cyanipardus,* Butl.

Symphædra cyanipardus, Butler, P. Z. S. 1868, p. 613.

Sub-sp. *A. cyanipardus sandakanus,* Fruhst.

The sub-species occurs in Borneo and doubtfully in Sumatra; the typical form is found in Assam, Silhat and Cachar, and a second sub-species occurs in Banca.

169. *Adolias canescens,* Butl.

Symphædra canescens, Butler, P. Z. S. 1868, p. 612 pl. 45, fig. 5.

Borneo. A sub-species is found in the Malay Peninsula and Sumatra.

Genus *Euthalia.*

Sub-genus *Bassarona*

170. *Euthalia* (*Bassarona*) *bellata*, Druce.

Adolias bellata, Druce. P. Z. S. 1873, p. 344, pl. 32, fig. 3.

The typical form is confined to Borneo, sub-species occur Tenasserim, Malay Peninsula, Sumatra, Nias and Java.

Sub-genus us *Rangasa.*

171. *Enthalia Rangasa dunya*, D. & H.

Adolias dunya, Doubleday and Hewitson, Gen. D. Lep. ii. p. 291, pl. 44, fig. 3 (1850).

Tenasserim, Malay Peninsula, Great Sunda Is., with a sub-species in Nias.

Sub-genus *Cognitia.*

This sub-genus is in the greatest confusion and a recent paper by Fruhstorfer (Berl. Ent. Zeitschr. XLIV. pp. 121—155 1899) has not cleared matters up very much; in fact until the opposite sexes of several of the species have been taken in coitû, the numerous types compared and the genital armature of the males dissected out no satisfactory revision of the sub-genus can be made.

From Borneo seven species have been recorded :—

1. *Euthalia ambalika*, Moore.
2. „ *vacillaria*, Butl.
3. „ *diardi*, Voll.
4. „ *asoka*, Feld.
5. „ *magnolia*, Stand.
6. „ *gopia*, Moore.
7. „ *gandava*, Voll.

The habitat of the last two species is extremely doubtful, in fact the only locality quoted for *E. gandava* is "0,072 meter," *E. gopia* may possibly be from the Malay Peninsula. *E. magnolia* is a Kina Balu species and *E. asoko*, Feld. has been wrongly recorded from Borneo as it has been confused with *E. vacillaria.* The remaining three species are found in Sarawak; specimens of all three have been taken at various times of the year at and around Kuching and in my opinion the species can be readily distinguished one from the other.

Examples of both sexes of the three species have been sent to the late Mr. L. de Nicéville, to Herr Fruhstorfer and have been compared with specimens in the British Museum (Natural History) named and as arranged by Dr. A. L. Butler; although I have not invariably found myself in accord with the opinions of these distinguished lepidopterists I am none the less deeply indebted to them for their valuable information and I have not found it impossible to reconcile their rather diverse opinions with what I consider to be the facts of the case.

Euthalia vacillaria, Butl. was described in 1868 from a female only, the male has never been described although male specimens agreeing exactly with male specimens in the Sarawak Museum collection stand under the name *vacillaria* in the British Museum collection. A description of the male follows :—*Upperside*—Very like the male of *Euthalia ambalika*, Moore, but the apex of the forewing is distinctly falcate, the pale blue fascia of the forewing is narrow and ends, as a rule, just below the lowest sub-costal nervule, on the hind-wing above, below the costal nervure is a large patch of black androconial scales, *Underside*, dull brown ochreous, the margin of the forewing from just below the apex to the second median nervule lilacine grey—Expanse 60 mm.

The falcate forewing and the large patch of androconial scales are the salient features of this species. This species may perhaps be only a sub-species of *E. gsoka*, Feld. from the Malay Peninsula but for the present it will be advisable to keep the two forms separate.

Euthalia ambalika, Moore was described in 1859 from a female and nine years taler a male described by Butler * was associated with this female but this male is really the male of *E. diardi.* On Mt. Penrisen in 1898 I observed an undoubted female *ambalika* with a male hovering round her and following her from one resting-place to another, fortunately I was able to secure both specimens and I have no doubt that they are the opposite sexes of the same species. The male differs from the male of *E. vacillaria* in the following points :—The apex of the forewing is not falcate ; the blue border of the forewings extends to near the apex of the wing and internally it is deeply but narrowly notched ; the patch of androconial scales is small or absent ; the colour of the underside is bright ochreous. The male is very variable in size and rather variable in colouration, the blue band of the upperside often being tinged with lilac and the underside is sometimes rather sullied the markings sometimes being clear sometimes obsolete. The female has no blue band on the upperside of the hind-wings. *E. ambalika* is possibly a sub-species of E. puseda, Moore from the Malay Peninsula, *E. blumei* Voll. from Java being another.

Euthalia diardi, Voll. was described in 1862 from a female. The male is to be distinguished from the corresponding sex of E. ambalika by the following points :—the blue fascia of the forewing is broad and extends to the apex of the wing ; the blue fascia on the hind-wing is very broad ; the androconial scales are reddish brown ; the underside is *not* bright ochreous but dull brown shaded with blacine near the apex of the forewing and on the sub-discal area of the hind-wing. The female is readily distinguished by a broad band of blue on the hind-wing. The species is probably merely a local race of *E. cocytina*, Horsf. from Sumatra.

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* Herr Fruhstorfer informs me that a specimen of what I consider to be the true male of E. ambalika is identical with the co-Type of E. diardi in his collection.

172. *Euthalia cynitia vacillaria*, Butl.

Adolias vacillaria, Butler, P. Z. S. 1868, p. 606, pl. 45, fig. 1.

Borneo.

173. *Euthalia cynitia ambalika*, Moore.

Adolias ambalika, Moore, Trans. Ent. Soc. 1859, p. 74, pl. 5, fig. 3.

Borneo.

174. *Euthalia cynitia diardi*, Voll.

Adolias diardi, Vollenhoven, Tijd. Ent. 1862, p. 188, pl. 10, fig. 2.

Borneo.

175. *Euthalia cynitia magnolia*, Staud.

Euthalia magnolia, Staudinger, Iris 1896 p. 235, pl. V. fig. 5.

From Kina Balu, North Borneo.

176. *Euthalia gopia*, Moore and *Euthalia gandava*, Voll. I do not include in this list for lack of proper evidence of the *provenance* of the species.

Sub-genus *Tasinga*.

177. *Euthalia Tasinga anosia*, Moore.

Adolias anosia, Moore, Cat. Lep. Mus. E. I. C. i. p. 187, (1857).

Found in Sikkim, Assam, Tenasserim, Burma, Malay Peninsula, Great Sunda Is., Bali, Banka.

Sub-genus *Dophla.*

178. *Euthalia* (*Dophla*) *evelina*, **Stoll.**

Papilio evelina, **Stoll, Cramer, Pap. Exot. V, p. 132, pl. 28, figs. 2, 2B.**

Sub-sp. *E. evelina compta*, **Fruhst.**

Fruhstorfer divides the species into 11 races ranging through India to Indo-China and the Malay Peninsula, the Great Sunda Is., Nias, Philippines and Celebes. The sub-species *compta* occurs in Burma, Tenasserim, Malay Peninsula, Sumatra and Borneo.

[The species is very partial to rotten fruit and I have caught many specimens in mosquito-netting traps baited with this butterfly delicacy.]

Sub-genus *Nora.*

The naturalist who attempts to clear up the confusion in which this sub-genus is shrouded will have no easy task to accomplish. In the past, species were described from single male and female specimens in the most reckless manner, whilst more modern authors appear to have shirked a careful revision of the group yet have not refrained from adding to the number of species in it, and the result is—chaos. For my own part I can do no more than give an annotated list of the species found in Borneo ; still, such local lists are the necessary preliminaries to an accurate revision of the entire group. It may be remarked *en passant* that many of the characters whereby the sub-genus *Nora* can be distinguished from *Euthalia* in its restricted sense are rather obscure e.g. the patch of glandular scales on the hindwing of the male is very variable and it occurs moreover in many species of *Euthalia* ; in the absence of the female sex of a species, it is often difficult to state whether that species should be referred to the subgenus *Nora* or not, the pattern on the underside of the wings is perhaps as good a character as any other.

179. *Euthalia (Nora) ramada*, Moore.

Adolias ramada, Moore, Trans. Ent. Soc. London, 1859, p. 69. pl. 4, fig. 5.

Sub-sp. *E. ramada surjas*, Vollenh.

There is no constant or essential difference between *E. surjas*, Vollenh, and *E. limbata*, Fruhst. (Berl. Ent. Zeitschr. XLIV. p. 140 1898). I have Herr. Fruhstorfer's authority for regarding *E. limbata* (i.e. *E. surjas* as a sub-species of *E. ramada*. The typical form comes from Malacca the sub-species seems to be confined to Borneo. The female of this species has yet to be determined with certainty Dr. Butler considers A. M. N. H. (7) vol. viii. p. 356 1901) that the female of *E. indras*, Vollenh is undoubtedly the female of *E. ramada*, whereas Herr. Fruhstorfer (l.c. p. 124 regards it as the female of *E. bipunctata*, Vollenh. Either authority may be right for the females of the species of *Nora* are most remarkably similar, but any opinions as to the correct pairing of the various species must be pure guess work until the respective sexes are actually captured in coitû. For reasons stated below I do not consider it at present advisable to sink the name *E. indras*, Vollenh. as a synonym of any other species.

180. *Euthalia (Nora) laverna*, Butl.

Adolias laverna, Butler, Cist. Ent. i. p. 29. (1870) ♀; Lep. Exot. p. 174, pl. 60, fig. 5 (1874) ♂.

Euthalia lavernalis, de Nicéville, Journ. Bombay N. H. Soc. 1893, p. 45.

From Borneo and the Malay Peninsula.

Butler now regards (A. M. N. H. (7) vol. viii. p. 357‘ 1901) his type female as equivalent to *E. somadeva*, Feld. a species described in 1867 from a single female specimen said to come from N. India and the male of Felder's species he considers to be *E. cordelia*, Fruhst. even though Fruhstorfer has described that species from both male and female specimens. Moore (Lep. Ind. vol. iii. p. 110) considers both the male and female of *E. laverna* Butl. to be the same as *E. somadeva*, Feld. All this is the purest guess work and for the present I prefer to let Butler's name stand and to exclude *E. somadeva* from the Bornean fauna until further evidence of its habital is forthcoming. So far as I know Butler having relegated to *E. somadeva* his type ♀ *laverna* has not described what he considers to be the true ♀ of the species.

In Northern Borneo, the bluish-green colour on the upperside of the hind-wings in the males becomes replaced by violaceous and the hind-wings of the females also become slightly tinged with this shade, whereas in South country females the hind-wings are brown; it is interesting to note that in the genus *Tanæcia* there is a similar tendency towards a violet colouration of the hind-wings in species from Northern Borneo, Southern forms being more or less unicolorous.

181. *Euthalia (Nora) Cordelia*, Fruhst.

Nora cordelia, Fruhstorfer, Berl. Ent. Zeitschr. XLIV. p. 121, (1899).

Confined to Borneo.

This species with its aberration *ilka* from Kina Balu is very close, perhaps too close to the preceding species, but it occurs in the same area with it and is constantly different from it though only slightly.

182. *Enthalia (Nora) indras*, Vollenh.

Adolias indras, Vollenhoven, Tijd. Ent. p. 194, pl. 11, fig. 2, (1862).

Confined to Borneo.

The species was described from a female specimen, which as already stated has subsequently been associated with *E. ramada*, Moore by Butler and with *E. bipunctata*, Vollenh. by Fruhstorfer. Here occurs in Borneo however a species, represented in the Sarawak Museum by a series of seven male specimens for which no name can be found ; the species is allied to *E. laverna* but is abundantly distinct from it and in conjunction with the late Mr. de Nicéville I regard this as the male of Vollenhoven's species. As already emphasised the pairing of species of *Nora* from cabinet specimens can only be provisional sspeculative and it is equally probable that (i) Vollenhoven's type female is a distinct species or (ii.) the female of *E. ramada*, Moore. It certainly is not the female of *E. bipunctata*, Vollenh. for that species has a female very like the female of *E. merta*, Moore also a *Nora*. The insect that I consider to be the male of *E. indras*, Vollenh. is now described :—

Upperside—Uniform olive-brown with the following markings :—

Forewing, an angulated submarginal series of sagittæ, white outwardly bordered with fuscous, the white becoming obsolescent towards the external angle of the wing ; a series of five white hastale markings internal to the submarginal series but fusing with it in the upper discoidal interspace ; the fuscous lines in and below the cell are arranged as in *E. laverna*, Butl. Hind-wing, a submarginal series of fuscous sagittæ bordered both internally and externally with a shading slightly paler than the ground colour ; markings in the cell as in *E. laverna*, Butl. ; below the costal nervure and occupying the basal costal and basal subcostal interspaces is a distinct patch of blade androconial scales which show up very clearly against the olive-brown of the rest of the wing. *Underside.*—Almost the same as in *E. laverna*, Butl. but less ochreous and the outer border of all the wings tinged with lilaci : on the hind-wing the submarginal sagittæ are much more clearly defined.

The hind-wing is more quadrate than in *E. laverna*, Butl. and the anal angle much more rounded. Expanse 49 mm. (*laverna* 52 mm.

183. *Euthalia* (*Nora*) *indistincta*, Butl.

Nora indistincta, Butler, A. M. N. H. (7) Vol. viii. p. 366, (1901).

Confined to Borneo.

This is yet another species described from a single female specimen. Butler suggests the possibility of this being "the female of an insect which has been regarded as the male of N. indras but which is much darker and redder on the under surface, and decidedly larger than the male of that species might be expected to be." The male alluded to by Dr. Butler and compared by me with specimens in the Sarawak Museum is quite a different species from the male just described as the male of *F. indras*, Vollenh. It is much larger, expanding 65 mm., the hind-wing is not so quadrate and the anal angle not pointed ; the markings and colouration of the two species are very similar, though in the larger species there is a shading of green at the external angle of the forewing above. The species is even closer to *E. laverna*, Butl. than is *E. indras* ♂ mihi and it might well be a seasonal place of that species. Butler's type female is certainly distinct from the other female *Noras* found in Borneo, but there is no particle of evidence to shew that it is the opposite sex of the male alluded to by Butler.

184. *Euthalia* (*Nora*) *bipunctata*, Vollenh

Adolias bipunctata, Vollenhoven, Tijd. Ent. 1892, p. 191, pl. 10, fig. 5.

From the Malay Peninsula, Borneo and Banka.

There are specimens in the Sarawak Museum agreeing well with Vollenhoven's description and with Distant's figure (Rhop. Malay, pl. XLIII fig. 3,). The female is very like the female of *E. merta* Moore as figured by Distant (l.c. pl. XLIII. fig. 2).

185. *Euthalia (Nora) tanagra*, Staud.

Felderia tanagra, Staudinger, Iris. 1889, p. 76.

Butler (l.c. p. 365) records this species from Borneo as well as from Palawan.

Sub-genus *Sonepisa.*

186. *Euthalia (Sonepisa) Kanda*, Moore.

Adolias Kanda, Moore, Trans. Ent. Soc. Lond. 1859, p. 69, pl. 4, fig. 5.

From Burma, Tenasserim, Malay Peninsula, Borneo, Sumatra.

Sub-genus *Euthalia.*

187. *Euthalia (Euthalia) adonia*, Cr.

Papilio adonia, Cramer, Pap. Exot. III, pl. 255, figs. C. D., (1779).

Sub-sp. *E. adonia whiteheadi*, Grose Smith.

Fruhstorfer considers *whiteheadi* to be a sub-species of *E. lubentina*, Cr. but this is incorrect. Grose Smith associated with his male type the female of another species of this group of *Euthalia*, a species subsequently described by Fruhstorfer as *E. adonia montana.*

The females of these two species have been confused with each other, which after all is not surprising both species occupying the same area viz., Mt. Kina Balu and other mountains in Borneo ; *whiteheadi* is however also found, though rarely, in the low-country and the Sarawak Museum collection contains a male and female caught together, close to Kuching; the female is very like Distants figure of *Euthalia adonia* ♀ (Rhop. Mal. pl. XIX fig. 11) and there is therefore no doubt that *whiteheadi* is a local race of *adonia*, not of the very different species *lubentina*.

The typical form of *adonia* occurs in Java and Sumatra *whiteheadi* is confined to Borneo, other sub-species are found in the Malay Peninsula, Lombok and Palawan.

188. *Euthalia* (*Euthalia*) *adeona*, Gr. Sm. and Kirb.

Euthalia adeona, Grose Smith and Kirby, Rhop. Exot. p. 13, Euth. pl. 4 fig. 5, 6 (1894).

Confined to Borneo.

189. *Euthalia* (*Euthalia*) *djata*, Dist.

Euthalia djata, Distant, A. M. N. H. 1889, p. 53.

Confined to Borneo, with a sub-species in Palawan.

190. *Euthalia* (*Euthalia*) *lubentina*, Cr.

Papilio lubentina, Cramer, Pap. Exot. II, pl. 155, figs. C. D. (1777).

Sub-sp. *E. lubentina montana*, Fruhst.

Owing to Grose Smith's original error Fruhst. describes as the female of *montana*, the female of *E. whiteheadi* and regard the sub-species as a local race of *E. adonia*, Cr.

The typical form of *lubentina* occurs in India, Ceylon, Burma and the Malay Peninsula, *montana* is found on Bornean mountains and other sub-species in Java, Bawean and the Philippines.

191. *Euthalia* (*Euthalia*) *garuda*, Moore.

Adolias garuda, Moore, Cat. Lep. Mus. E.I.C.T. p. 186, pl. 6, figs. 2 and 2A (1859).

Sub-sp. *E. garuda sandakana*, Moore.

The typical form occurs in India to Malay Peninsula, and Sumatra, with sub-species in Borneo and Bawean.

192. *Euthalia* (*Euthalia*) *jama*, Feld.

Adolias jama, Felder, Reio. Nov. Lep. III, p. 431 (1866).

Occurs in India, Assam, Burma, Malay Peninsula, Sumatra, Borneo.

193. *Euthalia (Euthalia) euphemia*, Staud.

Euthalia Euphemia, Staudinger, Iris. 1896, p. 238, pl. V. fig. 6.

Confined to Borneo.

194. *Euthalia* (*Euthalia*) *apicalis*, Voll.

Adolias apicalis, Vollenhovin, Tijd. v. Entom. 1862, p. 186, pl. 10, fig. 1.

Found in Burma, Tenasserim, Malay Peninsula, Borneo, Sumatra.

195. *Euthalia* (*Euthalia*) *aconthea*, Cr.

Papilio aconthea, Cramer, Pap. Exot. II, pl. 134, figs. C. D. (1779).

From Java and Borneo. It will probably be found that the Bornean race is distinct from the Javanese form.

196. *Euthalia* (*Euthalia*) *parta*, Moore.

Adolias parta, Moore, Cat. Lep. Mus. E. I. C. T. p. 185, (1857).

Confined to Borneo.

197. *Euthalia* (*Euthalia*) *zichri*, Butl.

Adolias zichri, Butler, Cist. Ent. T. p. 6, (1869).

From Tenasserim, Malay Peninsula, Borneo.

198. *Euthalia* (*Euthalia*) *eriphyle*, de N.

Euthalia eriphyle, de Nicéville, Journ. Bomb. Nat. Hist Soc. 1891, p. 353, pl. F. fig. 7.

From the Khasias, Tenasserim, Sumatra and Borneo.

The Sarawak Museum collection contains a specimen that I believe to be the female of this species ; it is like the female of *E. parta*, Moore but is smaller and darker in colour.

Pryer and Cator in the British North Borneo Herald 1894 give the following new species of Euthalia from N. Borneo :—*E. halimah*, *E. vesta*, *E. abayah*, *E. lakayah*, *E. borneensis*, no descriptions accompany these names which can now be dismissed as valueless.

Genus *Tanæcia.*

Butler in a recent paper on this genus (A.M.N.H. (7) vol. viii. p. 356, 1901) admits no less than fifteen species from Borneo xsi of which he describes as new, three being described from single specimens ; I cannot help thinking that this list is far too long a one and that many of the species are mere varietal forms or aberrations. It is impossible however to judge without a careful comparison of the types aided by dissection of the male genital armature, and I quote therefore on Butler's species with one or two slight modifications.

199. *Tanæcia orphne*, Butl.

Tanæcia orphne, Butl. A.M.N.H. 1870, p. 362.

Confined to Borneo. Fruhstorfer considers *T. orphne* to be the male of *T. valmikis*, Feld. but Butler denies this, the British Museum collection containing both sexes of the species.

200. *Tanæcia consanguinea*, Dist.

Tanæcia consanguinea, Distant, Entom. 1866, p. 11.

Confined to Borneo.

201. *Tanæcia lutala*, Moore.

Tanæcia lutala, Moore, Trans. Ent. Soc. Lond. 1859, p. 71, pl. 6, fig. 3.

Confined to Borneo. I believe that all these three species will eventually be proved to be one and the same.

202. *Tanæcia subochrea*, Butl.

Tanæcia subochrea, Butler, A.M.N.H. (7) vol. viii. p. 363. (1901).

Confined to Borneo. Very doubtfully distinct from *T. lutala*.

203. *Tanæcia margarita*, Butl.

Tanæcia margarita, Butler, A.M.N.H. (7) vol. viii. p. 363 (1901).

Confined to Borneo.

204. *Tanæcia valmikis*, Feld.

Adolias valmikis, Felder, Reise Nov. Lep. III. p. 434 (1867).

Confined to Borneo with a sub-species in Nias.

205. *Tanæcia apsarasa*, Voll.

Adolias apsarasa, Vollenhoven, Tijd. Ent. 1862, p. 198, pl. 11. fig. 3.

Forma typica, in South Borneo.
Sub-sp. *T. apsarasa munda*, Fruhst. in North Borneo.
Sub-sp. *T. apsarasa martigena*, Weym. in Sumatra.

206. *Tanæcia frühstorfferi*, Butl.

Tanæcia frühstorferri, Butler, A.M.N.H. (7) vol. viii p. 361 (1901).

Confined to Borneo. This and the next two species appear to be nothing but varietal forms of *T. apsarasa.*

207. *Tanæcia evanescens*, Butl.

Tanæcia evanescens, Butler, A.M.N.H. (7) vol. viii. p. 361, (1901.)

Confined to Borneo (Labuan).

208. *Tanæcia albifasciata*, Butl.

Tanæcia albifasciata, Butler A.M.N.H. (7) vol. viii. p. 361, 1901).

Confined to Borneo.

209. *Tanæcia pelea*, Fab.

Papilio pelea, Fabricius, Mant. Ins. p. 53, (1787).

Sub-sp. *T. pelea crowleyi*, Butl.

The typical form occurs in Malay Peninsula, Singapore, Billiton *crowleyi* is confined to Borneo, other subspecies are found in Java, Lombok and (?) Sumatra.

210. *Tanæcia clathrata*, Voll.

Adolias clathrata, Vollenhoven, Tijd. v. Ent. p. 205, pl. 12 fig. 5 (1862).

Forma typica, Borneo, low-country.

Sub-sp. *T. clathrata cærulescens*, Grose-Smith—Borneo, Mountains.

Sub-sp. *T. clathrata nicévillei*, Dist.—Malay Peninsula, Sumatra.

The form *cærulescens* is quite abundant on Mts. Matang and Santubong, Sarawak, whereas in the low-country the typical form abounds; a pair of the latter taken *in coitu* are in the Sarawak Museum collection.

Fruhstorfer suggests that *Tanæcia varuna*, Voll· recorded originally from Java occurs in Borneo only.

Sub-genus *Passirona.*

211. *Tanæcia (Passirona) amisa*, Grose-Smith.

Euthalia amisa, Grose-Smith, A.M.N.H. 1889, p. 315.

From Mt. Kina Balu, North Borneo.

Genus *Vanessa.*

212. *Vanessa canace*, Joh.

Papilio canace, Johanssen, Amœn. Acad. vi. p. 406 (1764).

Sub-sp. *V. canace perakana*, Dist.

The typical form occurs in the Indian region, *perakana* is found in the Malay Peninsula, Java and Sumatra and other sub-species in Sumatra, Luzon, Japan, Corea.

Genus *Rhinopæpa.*

213. *Rhinopæpa polynice*, Cr.

Papilio polynice, Cramer, Pap. Exot. III. pl. 195 fig. D. E. (1780).

From Malay Peninsula, Sumatra and Borneo with sub-species in Burma, Assam, Java, Nias and Luzon.

Genus *Symbrenthia.*

214. *Symbrenthia hippoclus*, Cr.

Papilio hippoclus, Cramer Pap. Exot. III. p. 46, pl. 220, fig. C. D. (1779).

Sub-sp. *S. hippoclus marius*, Fruhst.

The typical form is confined to Amboina, *marins* to Borneo, other sub-sp. occur in Sikkim, Siam, Tonkin, Assam, China, Philippines, Java, Sumatra, Lesser Sunda Is., Celebes, Moluccas, New Guinea and adjacent isles.

215. *Symbrenthia hypselis*, Godt.

Vanessa hypselis, Godart, Enc. Méth. ix. Suppl. p. 818 (1823).

Sub-sp. *S. hypselis balunda*, Staud.

This sub-species occurs on Borneo mountains, other races occur in Java (typical form), Sumatra, Malay Peninsula, Nias, Palawan, Khasia, Himalayas, Assam, Burma, Tenasserim.

216. *Symbrenthia hypatia*, Wall.

Laogona hypatia, Wall.

Sub-sp. *S. hypatia hippocrene*, Staud.

This sub-species is found in Borneo, the typical form was described from Java and another sub-species occurs in the Malay Peninsula and Sumatra.

[The species of the genus *Symbrenthia* mimic the yellow and black *Neptides*; they fly in the same jerky manner with the wings held out quite flat so as to display to the best advantage the colouring of the upper surfaces.]

Genus *Cyrestis*.

217. *Cyrestis nivea*, Zink.—Somm.

Amathusia nivea, Zinken—Sommer, Nova. Acta. Acad. N.C. 1831 p. 138, pl. 14, fig. 1.

Sub-sp. *C. nivea nivalis*, Feld.

The typical form occurs in Java, sub-species in Burma, Tenasserim, Malay Peninsula, Sumatra, Borneo, and Sumba.

218. *Cyrestis seminigra*, Grose Smith.

Cyrestis seminigra Grose. Smith, A.M.N.H. 1889, p. 313.

Confined to Borneo.

219. *Cyrestis cocles*, Fab.

Papilio cocles, Fabricius, Mant. Ins. ii. p. 7, (1787).

Sub-sp. *C. cocles sericens*, Butl.

The typical form occurs in the Indian region to Malay Peninsula other sub-species occur in Indo-China, Andamans and Borneo (*sericens*).

220. *Cyrestis theresæ*, de N.

Cyrestis theresæ, de Nicéville, Journ. As. Soc. Bengal, 1894, p. 18, pl. 5 fig. 8.

From Sumatra and Borneo.

221. *Cyrestis neela*, Swinh.

Cyrestis neela, Swinhoe, A.M.N.H. (6) xiv. p. 430 (1894).

From N. Borneo. This may be synonymous with the preceding species.

Sub-genus *Chersonesia*.

222. *Cyrestis* (*Chersonesia*) *rahria*, Moore.

Cyrestis rahria, Moore, Cat. Lep. Mu. E.I.C. i. p. 147, pl. 3A fig. 2, (1857).

The species occurs in the Malay Peninsula, Great Sunda Is. Nias with sub-species in Burma and Tenasserim Celebes and Sula Is. The species is extremely variable in size.

223. *Cyrestis* (*Chersonesia*) *peraka*, Dist.

Chersonesia peraka, Distant, A.M.N.H. 1884, p. 199.

From Tenasserim, Malay Peninsula, Sumatra and Borneo.

Genus *Kallima*.

224. *Kallima inachus*, Boisd.

Paphia inachus, Boisduval, Crochard's Edit. Cur. Rég. Anim. Ins. ii. pl. 139, f. 3, (1836).

Sub-sp. *K. inachus buxtoni*, Moore.

Fruhstorfer (Berl. ent. Zeitschr. XLIII. 1898 p. 193) divides this species into twelve local races occurring in the Indian region China, Japan, Malay Peninsula, Sumatra, Borneo and Nias; *buxtoni* is confined to Borneo and Nias. The species is very rare in Borneo.

Genus *Doleschallia.*

225. *Doleschallia bisaltide*, Cr.

Papilio bisaltide, Cramer, Pap. Exot. ii. pl. 102, fig. C. D. (1779).

Sub-sp. *D. bisaltide borneensis*, Fruhst.

Fruhstorfer (l.c. XLIV. 1899 p. 27A) divides the species into seventeen local races of which *borneensis* is confined to Borneo; other sub-species occur in India, Ceylon, Tenasserim, Malay Peninsula, Great and Lesser Sunda Is., Celebes, Moluccas, New Hebrides, Viti, Guadalcanar, Philippines.

Genus *Eulepis.*

226. *Eulepis schreiber*, Godt.

Nymphalis schreiber, Godart, Enc. Méth IX. Suppl. p. 825, (1823).

Sub-sp. *E. schreiber malayicus*, Rothsch.

This race is found in Borneo, Sumatra, Malay Peninsula, Banca, Billiton; other races occur in India, Assam, Burma, Java, Nias, Luzon.

227. *Eulepis hebe*, Butl.

Charaxes hebe, Butler, P.Z.S. p. 634, n. 46, pl. 37, f. 39, (1865).

Sub-sp. *E. hebe ganymedes*, Staud.

The species ranges from the Malay Peninsula through the great and Lesser Sunda Is. ; *ganymedes* is confined to Borneo.

228. ***Eulepis moori***, Dist.

Charaxes moori, Distant, Rhop. Mal. p. 108, n. 6, pl. 13, f. 3, (1883).

Sub-sp. *E. moori heracles*, Röber.

From Assam, Burma, Malay Peninsula, Sumatra, Nias, Natuna Is. Borneo (*heracles*) Java.

It is practically certain that the sub-species *E. moori sandakanus* does *not* occur in Borneo (of Novitates Zoologicæ VI. p. 243, 1899).

229. ***Eulepis athamas***, Drury.

Papilio athamas, Drury, lu. Ex. lus. I. p. 5. pl. 2 f. 4 (1773).

Sub-sp. *E. athamas wiæus*, Rothsch.

From Sumatra, Borneo and Natuna Is., with other races in India region, Indo-China, S. China, Malay Peninsula, Java, Philippines, Palawan, Timor.

230. ***Eulepis jalysus***, Feld.

Charaxes jalysus, Felder, Reis. Nov. Lep. p. 438, pl. 59 f. 5, (1867).

From Burma to Borneo and Sumatra.

231. ***Eulepis delphis***, Doubl.

Charaxes delphis, Doubleday, Ann. Soc. Ent. France (2) I. p. 217, pl. 7, (1843).

Sub-sp. *E. delphis concha*, Vollenh.

The species occurs in Assam (forma typica), Burma to Sumatra (*concha*), Java (*cygnus*), Palawan (*niveus*)

Fruhstorfer regards the Bornean representatives as yet another race (*delphinion*).

Genus *Charaxes*.

232. *Charaxes durnfordi*, Dist.

Charaxes durnfordi, Distant, Entom. XVII. p. 191, (1884).

Sub-sp. *C. durnfordi everetti*, Rothsch.

The female of this sub-species is now described for the first time :—

♀ *Upperside* much paler than in the male ; forewing, the discal white markings enlarged, the cell closed by a double dark line, the sub-marginal white sagittæ much larger than in the male ; hind-wing, the sub-marginal ocelli are not completely encircled by a whitish ring as in the male, as outwardly the "iris" of each ocellus merges in the heavy brown marginal line, the "pupil" of the innermost ocellus is suffused with blue.

Underside very much paler than in the male, median interspaces deep brown.

Expanse 110 mm ; length of outer tail 8 mm.

Hab. Kuching ; taken in a trap baited with rotten bananas.

The species occurs in Burma, Tenasserim, Malay Peninsula and Great Sunda, Is., *everetti* is confined to Borneo.

233. *Charaxes distanti*, Honr.

Charaxes distanti, Honrath, Berl. Ent. Zeitschr. XXIX. p. 277, (1885).

Tenasserim, Malay Peninsula, Natunas, Borneo, Sumatra.

234. *Charaxes polyxena*, Cr.

Papilio polyxena, Cramer, Pap. Exot. I. p. 85, pl. 54, fig. A. B. (1775).

Sub-sp. *C. polyxena repetitus*, Butl.

Indian region, China, Malay Peninsula, Sumatra, Banka, Billiton, Borneo, Java, Nias, Palawan.

235. *Charaxes harmodius*, Feld.

Charaxes harmodius, Felder, Reis. Nov. Lep. p. 445, (1867).

Sub-sp. *C. harmodius infernus*, Rothsch.

Java, Sumatra, Palawan, Borneo (*infernus*).

236. *Charaxes borneensis*, Butl.

Charaxes borneensis, Butler, Lep. Exot. p. 16, pl. 6, fig. 2 (1869).

Malay Peninsula, Sumatra and Borneo.

237. *Charaxes fabius*, Fab.

Papilio fabius, Fabricius, Spec. Ins. II. p. 12, (1782).

Sub-sp. *C. fabius echo*, Butl.

This sub-species is found in the Malay, Peninsula, Sumatra and Borneo. Other sub-species occur in India, Ceylon, Tenasserim, Burma, Philippines, Sula Is., Celebes.

Genus *Prothoë*.

238. *Prothoë calydonia*, Hew.

Nymphalis calydonia, Hewitson, Exot Butl. i. p. 86, pl. 43, fig. 3, 4, (1855).

Malay Peninsula, Sumatra, Borneo.

There are four species in the Sarawak Museum, all taken in traps baited with rotten fruit.

239. *Prothoë francki*, Godt.

Nymphalis francki, Godart. Enc. Méth. IX. Suppl. p. 825, (1823).

Sub-sp. *P. francki angelica*, Butl.

Angelica occurs in Tenasserim, Malay Peninsula, Borneo, Sumatra, and Billiton; other sub-species are found in Java, Banca, Nias, Palawan and Philippines.

Fam. LEMONIIDAE.

Sub-fam. LIBYTHAEINAE.

Genus *Libythaea*.

240. *Libythæa myrrha*, Godt.

Libythæa myrrha, Godart, Enc. Méth. ix. p. 171, (1819).

This occurs in the Great and Lesser Sunda Is., with sub-species in India, Ceylon and Malay Peninsula.

The species is not found in S. Borneo at all, but is apparently not uncommon in the North.

Sub-fam. NEMEOBIINAE.

Genus *Zemeros*.

241. *Zemeros flegyas*, Cr.

Papilio flegyas, Cramer, Pap. Exot. III. pl 280, figs. E.F. (1872).

Sub-sp. *Z. flegyas albipunctata*, Butl.

This sub-species is found in the Malay Peninsula, Sumatra and Borneo, other races occur in Indo-China, Tenasserim, Burma, Siam, China, Java, Nias.

242. *Zemeros emesioides*, Feld.

Zemeros emesioides, Felder, Wien. Ent. Mon. IV. p. 396, (1860).

Sub-sp. *Z. emesioides eso*, Fruhst.

This Bornean race is separated by Fruhstorfer from the typical form which flies in the Malay Peninsula and Sumatra.

Genus *Dodona.*

243. *Dodona deodata*, Hew.

Dodona deodata, Hewitson, Entom. Month. Mag. xiii. p. 151, (1876).

Sub-sp. *D. deodata pryeri*, Moore.

The sub-species occurs in Borneo, the typical form in Burma.

244 *Dodona elvira*, Staud.

Dodona elvira, Staudinger, Deuts. Ent. Zeitschr. 1896, p. 239, pl. 5, fig. 6, ♂. Shelford, Journ. As. Soc. Straits Br. No. 33 p. 258 ♀.

Confined to Borneo. A female aberration from Kina Balu is termed by Fruhstorfer ab. *pura.*

Genus *Taxila.*

245. *Taxila thuisto*, Hew.

Taxila thuisto, Hewitson, Exot. Butl. ii. *Tax.* pl. 1. figs. 5, 6, (1861).

In Burma, Tenasserim, Malay Peninsula, Sumatra, Borneo.

246. *Taxila haquinus*, Fab.

Papilio haquinus, Fabricius, Ent. Syst. iii. p. 55, (1793).

Malay Peninsula, Java, Borneo, Burma, Tenasserim, Siam, Mergui Archipelago, Palawan.

247. *Taxila zemara*, Butl.

Abisara zemera, Butler, A.M.N.H. 1870, p. 363

Borneo.

Fruhstorfer regards this as the local race of *T. haquinus* ; the two species—as I prefer to regard them—fly together, though *zemara* is much the rarer of the two ; the females are quite different from each other, the yellow apical fascia being a salient feature of *zemara* ♀, whilst the blue markings on the underside are larger.

Genus *Laxita.*

248. *Laxita orphna*, Boisd.

Emesis orphna, Boisduval, Spéc. Gén. Lép. i. pl. 21, fig. 4, (1836).

Sumatra and Borneo with a sub-species in the Malay Peninsula.

249. *Laxita teneta*, Hew.

Taxila teneta, Hewitson, Exot. Butl. ii. Tax. pl. 1, figs. 3, 4. (1861).

Borneo.

Fruhstorfer refers this to the genus *Taxila.*

250. *Laxita telesia*, Hew.

Taxita telesia, Hewitson, Exot. Butl. ii. Tax. pl. 1, figs. 1, 2, (1861).

The typical form occurs in Borneo and on Mt. Kina there is a distinct race :—Sub-sp. *L. telesia ines*, Fruhst. ; a second sub-species occurs in the Malay Peninsula and Sumatra.

251. *Laxita nicevillei*, Röber.

Laxita nicevillei, Röber, Ent. Nachr. No. 10, p. 149, 1895.

Borneo.

The species which appears to be known only from females is unknown to me.

252. *Laxita damajanti*, Feld.

Abisara damajanti, Felder, Wien. Ent. Monat. iv. p. 397, (1860).

Sub-sp. *L. damajanti lola*. de N.

The typical form occurs in the Malay Peninsula and Sumatra, the sub-species in Borneo.

253. *Laxita hewitsonii*, Röber.

Laxita hewitsonii, Röber, Ent. Nach. No. 10, p. 150, (1895).

Borneo.

Genus *Sospita.*

254. *Sospita savitri*, Feld.

Abisara savitri, Felder, Wien. Ent. Monat. iv. p. 397, (1860).

Sub-sp. *S. savitri sciurus*, Fruhst.

Sub-sp. *S. savitri strix*, Fruhst.

The first of these two sub-species occurs in the low-country of Borneo, the second on Mt. Kina Balu. The typical form occurs in the Malay Peninsula.

Genus *Abisara.*

255. *Abisara Kausambi*, Feld.

Abisara Kausambi, Felder, Wien. Entom. Monats. iv. p 397, (1860).

Tenasserim, Malay Peninsula, Sumatra, Borneo with sub-species in Nias, Palawan, Java.

256. *Abisara Kausambioides*, de N.

Abisara Kausambioides, de Nicéville, Journ. As. Soc. Beng. 1895, p. 442.

Sub-sp. *A. Kausambioides tera*, Fruhst.

The sub-species is confined to Borneo, other races occur in the Malay Peninsula, Sumatra, Nias, Java.

An expedition to Christmas Island.

By Henry N. Ridley.

The expedition to Christmas Island undertaken by Dr. Hanitsch and myself accompanied by the two Assistant Taxidermists, De Fontaine and Ahwang, the plant collector Kassan and two boys, started for Christmas Island on September 20th, 1904, in the S.S. "Islander," and reached Anjer Point on the 23rd. The weather was bright and fine with a fairly strong breeze. Little of note occurred on the way except that I may record seeing no less than eleven *Attagen minor* together at one point in the Banka Straits, a moth, *Ophideres* sp. flew on board when we were nearing Anjer and well out of sight of land, and a snippet probably Tringa sp. flew round the ship.

The boat arriving at Anjer at night 7.30 remained till 11 but it was too late to go on shore. After passing Anjer Point the sea became very rough and we only reached Christmas Island on Sunday (25th) evening at five o'clock, too late to land baggage That evening we remained on board till next day when all was safely landed and conveyed to a house kindly put at our disposal by Mr. Macpherson.

During the transit from Anjer the beautiful orange tropic bird *Phœthon fulvus* appeared first about midway between Java and Christmas Island. This bird was originally described from specimens of unknown locality. It appears to be almost confined to Christmas Island, but is said to fly as far as Southern Java. A large brown shark and a turtle were also seen on the way over.

After landing our baggage we made an excursion up towards the waterfall as far as the first Reservoir, collecting plants and insects, and on the following day I walked to the waterfall, Dr. Hanitsch finding quantities of interesting specimens did not go as far. The walk about five miles is very picturesque. After passing through the Settlement one rises across two raised reefs, past the tram line which conveys the phosphate to the tip whence it travels by overhead wires to the wharf, and above the first reservoir arrives at the plateau. Here the flora is quite different from that of the reefs, or terraces as Andrews calls them. The seashore trees *Guettarda*, *Gyrocarpus*, *Berrya*, *Kleinhovia* disappear together with the *Abutilons*, *Croton caudatus*, *Acronychia* etc. The plateau forest chiefly consists of *Eugenia*, *Barringtonia*, *Pisonia*, *Cryptocarya Sideroxylon*, while *Randia*, *Saprosma*, *Corymbis*, *Ardisia* and ferns form the undergrowth. The soil is dark brown and powdery, but here and there masses of coral reef protrude. The big crab, *Birgus Latro* and the smaller burrowing red crab, *Geçarcinus* are very abundant. Sea birds are absent though occasionally they may be seen crossing above the forest. The large pigeon *Carpophaga* is abundant and its cooings can be heard far and wide. The hawk, (*Astur*) is frequently seen, and the ground pigeon *Chalcophaps* and the thrush are abundant. Whiteeyes *Zosterops*, the swift *Collocalia* and in the evening the small bats only occur along the cleared tracks, and in more open places. The lizards too do not frequent the shadier parts of the forest.

After crossing the plateau one descends a steep slope to an open flat spot above the sea where are a few native houses for the men employed at the pumping station by which the water is pumped in iron tubes to the Settlement along the track. The water comes out abundantly flowing as it seems always to do from spots where the coral reef overlies the basalt. There are three more small streams along the coast to the north. Where the water comes out of the rock a small pool has been made in which are numerous small freshwater crabs and prawns, not previously recorded from the Island. The flora of this point includes numerous plants not met with on the other coast—*Calophyllum inophyllum* big trees with more straight and tall stems than one usually sees, *Ochrocarpus ovalifolius*, *Wedelia*, *Cyperus pennatus*, a shrub suspiciously like *Clerodendron inerme* but of which I could never find a trace of flowers or fruit, *Crinum asiaticum* and *Ipomea pescapræ* were abundant there also.

Next day was devoted to the flora of the Cove and beyond Smith Point. Here just beyond the Magistrate's house there is a short track to the point, a mass of sharp-pointed coral with the regular seashore trees, *Pisonia grandis*, *Ochrosia*, *Ficus retusa*, *Pandanus nativitatis* forming dense thickets while on the barer rocks overhanging the sea are bushes of *Pemphis acidula* and *Scoevola* with much of the grass *Ischœmum*, and *Euphorbia hypericifolia*, and I added to the flora here *Cyperus Iria*, and a small *Selaginella* of which one or two bits were found growing in a hole in the rocks over the sea. Further search on several occasions was not rewarded by a single scrap more of this unexpected find. The great and continued hot and dry weather had dried up many of the smaller herbaceous plants, and this plant should be carefully sought again in damper weather. There is a fine view from Smith Point both into Flying Fish Cove and to North West Point and it is possible to push along the cliff edge by tracks used by fisherman for some way.

Dr. Hanitsch meanwhile had found a small puddle of water on the top of a rock containing Copepoda, which were carefully collected. A number of interesting plants were collected including fruiting specimens of *Acronychia Andrewsi.* The fruit, not previously described, is a small juicy flesh-coloured berry *Erythrina indica* was in flower and visited by numerous white-eyes which sought for insects among the scarlet blossoms. The tree appears not to be common now and I saw it nowhere else but here and round the Cove. I picked up flowers of it in the same district when I visited Christmas Island fourteen years previously. Among the rocky woods beyond Smith Point I found a large puffball about 4 inches tall with a broad stalk and a rounded top, 3½ inches through. It was of a pale fawn colour outside, but when the outer coat was rubbed off bright yellow beneath, the flesh was white. There were a good many of the soft fungi to be found in the earlier part of our visit, in shady places, but as the country got dryer they were more scanty. Among them I several times found two species of *Coprinus* both resembling species I have met with in Singapore, but these are so delicate and fugacious that before we could get them home they had utterly perished. *Polypori*, *Polysticti* and other woody fungi were very abundant on decayed wood and a large number were collected. I noticed in them a great scarcity of beetles. Usually these woody fungi are the prey of innumerable beetles of several different groups, but here I could find few or no traces of these insects even in old specimens. Two of the fungi here are eaten by natives. One is *Hirneola Anriculæ-Judæ*, the well-known Jew's ear fungus, known to Malays as chendawan Telinga.

The other is a white agaricus which is very common on dead wood, a very poor kind of food.

In the evening I walked along the cemetery road collecting.

On the next day, 29th, I walked with Mr. Macpherson to Phosphate Hill, and examined the quarries. Many of the introduced weeds from Flying Fish Cove have found their way up here already, the seeds carried up doubtless on the clothes of the coolies, but besides these I found the common grass *Setaria glauca* and the little yellow Convolvulus *Ipomea chryseides* there which I found nowhere else, both new records for the Islands. Pigeons were very abundant here, as the trees on the fruit of which they particularly feed were bearing heavily. These trees are *Sideroxylon* and *Cryptocarya*. The coolies here were felling many trees to clear the ground for further excavations, and this gave me an opportunity of getting good specimens of the above; mentioned trees.—*Hernardia* and a common tree with bipinnate leaves and rather hard green drupes. Of this latter I was never able to procure flowers, and have not yet identified * but it was not obtained apparently by Andrews. Passing through the coolie lines, we went along a track which had been cut for drainage and abandoned, and came to the edge of a high cliff from which could be obtained a beautiful view of North East Point.

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* *Tristiriopsis nativitatis* Hemsley

Looking down on the two great terraces lying below and running parallel with the coast line it was difficult to believe that we were looking down on the tops of trees over 100 feet tall. So dense and equal were they, that one seemed to be looking on grass and bushes. The cliff is about 600 feet above sea level, and nearly vertical, but it might be possible to descend it. The three terraces are distinct to the North but one runs out a little beyond the point where we were to the South where apparently at some time a good deal of stream denudation has taken place. This track was said to have been first made by Mr. Andrews so that we named its terminus Andrew's Lookout. Here grow several plants of interest. Just above the Lookout, were a number of gigantic smooth barked trees bare at the time of my first visit but at the end of our stay revisiting the spot they bore pinnate leaves, red when young, and panicles of small white flowers, with blackish drupes 1½ inch long with acid yellow flesh. They were a species of Hog plum *Spondias.* The trees were too big to climb but we managed to get fallen flowers and fruit and a bough of leaves. This was an interesting discovery as the Hog plums are rather characteristic of Polynesian Islands. None were seen on any other part of the Island, nor on the lower cliffs of the North East Point. The ground was strewn with fallen fruit which was apparently not touched by any birds, or the fruit bats. They were much too far from the sea for the seed to have been washed up into that position, in the present condition of the Island, and the circumscribed area which they occupied, and the piles of untouched fruit beneath the trees seemed to suggest that no bird at present on the Island could act as seed-disperser. On the rocks of the cliff edge, were *Colubrina pedunculata* Baker, a large straggling shrub, just coming into leaf and bearing only the dry capsules of last season, and *Premna lucidula* Miq., a shrub of which we got fruit and flowers later. The common *Croton caudatus* formed troublesome thickets along the edge. It apparently flowers but seldom here, but its brilliant red withering leaves brighten up the woods and make it very conspicuous. *Ficus saxophila* a truly rock or rather precipice loving tree about twenty feet tall, had bright yellow figs on it, but the figs of a tree at Steep Point were bright red. *Crinum asiaticum* a quite typical form is abundant here and all along this coast, growing in holes in rocks in rows on the precipices, a most unusual locality for this plant which one is accustomed to see in the sea sand. I returned by the branch pipe line to the Irvine Hall Reservoir on the waterfall track. In the evening collected among other plants at the wharf, *Ipomea grandiflora* a convolvulus like a poor and small form of the moon flower, *I bona-nox* and found also the pretty moth *Deiopeia pulchella* an insect which contrives to get all over the world, even to England where however it is considered very rare. It is common on the open rocks above the sea, and one came into light on one occasion. The lizard *Lygosoma atrocostatum* is common here, I saw it also on the sea rocks at the waterfall and at the further end of Flying Fish Cove. It never seems to go far from the sea and seldom appears till the evening.

Next day (29th) was spent in collecting in Flying Fish Cove and its vicinity and the following day I started up Phosphate Hill to go to the North East Point by way of the new drainage track from the coolie lines. The descent from the top of the upper terrace is over a mass of talus of coral rock rather steep and slow going, then through sloping woods, chiefly of *Celtis* and *Randia* to the sea cliff edge through a band of Pandanus, a fisherman's track. The scrub is too dense to get far along the cliff edge so we had to go through the wood along the coast line in a northerly direction. Having been informed that it was possible to get round North East Point and return by the cemetery track except for a barrier, which might be and indeed had been successfully passed we went as far as time would permit towards the North East Point intending to return the way we came. Passing through these woods a white egret was seen (*Demiegretta sacra* ?) on a spot which appeared to have been a stream. Soon the base of the second terrace was reached, and a troublesome mass of tall sharp rocks covered with a dense grove of pandans was crossed. By no means impossible though rough and wearying ; expecting to come to the " barrier" we pushed on to a thick but more open bit, whence we returned, and eventually discovered that this mass of rocks and pandans was the terrible barrier, its difficulties having been greatly exaggerated. In fact it is, though a stiff walk, quite possible to walk round the coast from the Settlement round North East Point to the waterfall and so back in the day without much trouble.

On Monday the 3rd October I went with the plant—collector past Rocky Point along the cemetery road to North East Point till we came to the Pandan Scrub again. *Hibiscus vitifolius* a tall mallow with primrose coloured flowers with a pink eye occurs here scantily. It has not been found elsewhere in the Island. A large shrubby plant like a *Triumfetta*, 6 feet tall with very adhesive capsules covered with viscid hooks, grew in masses. No flowers were seen. I found a mass of its burs adhering to my sock when I got home so sticky were they. *Celtis* was coming into flower as were *Macaranga* and *Grewia*. At one point fishermen or runaway coolies had burnt the scrub towards the sea the result of which was a dense upgrowth of *Gyrocarpus* seedlings now about 8-10 feet tall to the exclusion of almost every thing else. While taking lunch a whiteeye flew and settled on my bag where it dropped an ornamental red black and white cricket, new to our collections.

October 4th. This morning Dr. Hanitsch and I with the Plant Collectors and Taxidermists, as well as a Chinese pigeon-catcher, Ah Soo, started to explore the plateau ascending by a somewhat difficult passage up the rocks at the Northwest corner of the Cove, known as Tom's Ladder. This rock cleft was formerly easier on account of a big fig root which served as a hand hold, but it was now dead and rotten and broke in two. However by taking off our shoes with the aid of Ah Soo we succeeded in climbing up. The ground above was a steep earthy slope, with large bushes of *Colubrina* and a short tufted grass. *Panicum* n. sp. new to the flora occurred here, above the plateau is level, and we went along a pigeon-catcher's track till it joined the Murray Hill Road and brought us out on the pipe-line at Irvine Hall. Ah Soo climbed one of the trees and caught three of the large pigeons with a noose on the end of a long stick, and could have caught two more had we permitted it. The birds which sat together in the top of the tree did not seem the least alarmed at their companions being caught. We were informed that during high wind they never coo, and indeed they certainly were more quiet when the wind blew at all strongly. I may say that I never but twice saw any on the ground. One at the waterfall appeared to be sick or injured, the other was a strong healthy bird. Ferns are abundant on this part of the plateau the ground being covered in parts with a dense carpet of *Acrostichum.* I sought carefully for the *Trichomanes parvulum* but only found its prothalli, perhaps the adults had dried up owing to the heat. In the evening I succeeded in catching the humming bird hawkmoth *Macroglossa* which I had tried several times before to get. It frequented the flowers of *Morinda* at dusk. This far ranging insect had not previously been taken in the Island. The next two days were occupied in exploring Phosphate Hill, and the coast beyond Smith Point. The shore terrace here is very barren the flora being very monotonous, and the greater part of the way covered with pinnacles of coral rock very troublesome to cross.

On the 7th all started to the waterfall to camp there for a few days. We obtained through the kindness of Mr. Mcpherson a number of Chinese coolies and the use of a pack pony. For shelter we took two Government tents which were very fine affairs but utterly unsuited to the country, as it required 13 men to carry them which with the very limited number of coolies ever available, makes their use almost impossible. The first plant of note obtained was a grass which made a close soft turf often 6 inches or more deep, on the cliff tops above the sea. It proved to be *Lepturus filifarmis* and I was told that it was a good fodder grass for horses, who would not however eat it until it had been well washed to get rid of its salinity. A number of small brown and green grasshoppers frequented it and were seen nowhere else. They were coloured so like the leaves and stalks of the grass that they were not easy to see and often when pursued dived down among the stems where they could not be caught.

In the afternoon I went with Kassan through the woods along the shore to the south towards Steep Point, and after passing through a mass of lofty and picturesque rocks, found a fisherman's track which ran along a projecting point of rocks and ended in a very pretty little bay, with a white coral beach beyond which the big rollers broke over great masses of coral reef, where were many of the splendid large blue fishes which seem constantly to haunt the broken water on the reefs. On the right of the bay facing the sea the rocks were low and broken up into sharp pinnacles, troublesome to walk over. *Tournefortia*, *Scoevola* and a curious form of *Pemphis acidula* were the characteristic plants. The *Pemphis* formed large shrubs more or loss erect except where exposed to heavy winds, where they were quite prostrate covering the rocks with a close mat of twigs and foliage, but the most remarkable point about this form was the very thick fleshy leaves, quite unlike those of the common form round Flying Fish Cove, which had the usual rather hard and dry leaves. Its appearance, especially that of the prostrate form, was so different that I took it at first for a distinct species, but the flowers and fruit are identical with those of the ordinary form. A few seaweeds and some fine cowries were obtained on the reef, and then we ascended the higher promontory on the North side of the bay by a fisherman's track. It was covered in part with a mass of the yellow flowered composite *Wedelia*, with bushes of *Tournefortia*, *Pandanus*, etc., but the terminal portion of this promontory consisting of the same brown pinnacles of rock as on the other side produced only the pink-flowered fleshy plant *Sesuvium portulacastrum* not previously recorded from Christmas Island. An old Javanese woman at the Waterfall told us that the Sepit as she called it was delicious when cooked and that she was a great hand at cooking it. Though abundant so close to the Waterfall she had no idea that there was any to be got. A day or two later we collected a quantity and had it boiled. It was indeed excellent, tasting like something between French beans and spinach. It requires however a good deal of washing previously as otherwise it is very saline. The plant is one of very wide distribution and occurs on most tropical sea coasts in the Old and New Worlds, growing on rocks or mud always close to the sea. From this headland a good view of Steep Rock and South Point can be got. Sea birds were abundant here, and the common boobies were nesting among the pinnacles of projecting rock. The nests were placed on the ground and consisted of bits of stick, birds bones, scraps of Sesuvium, etc. The eggs were two, chalky white and usually dirty. One nest contained two unfledged birds, one of which was dead, Revisiting the spot later I found the dead bird gone and the other apparently dying. Though there were generally two eggs in the nest I never except on this occasion saw more than one young bird in a nest, whether the female bird is unable to bring up more than one at a time I do not know. In or close to the nest was usually a fish to be seen, brought by the parents. The hen bird usually sat alone on the nest, feebly pecking from side to side at nothing when a stranger approached. Occasionally the male sat by her also, but except for the feeble demonstration of anger described they made no attempt to defend the nest. The female when approached too near tumbled and flapped along the ground as if either too stiff with sitting or feebly pretending to be injured. In the trees in the bay a number of young boobies in white plumage sat so tame that they could easily be touched by hand, although they could readily fly. Dr. Hanitsch photographed a group. The small black heron and white egret were also seen in this bay. On our way back to camp Kassan discovered a plant of a species of *Balanophora* entirely pale yellow. This was a most unexpected find, as these parasitic plants were not recorded from any oceanic Island previously. Careful search for more produced no result here but I later found another above Steep Rock, and one in the centre of the Island. The plant was growing in loose soil on the shore terrace which was wooded with the ordinary shore terrace trees and covered with an undergrowth of *Dicliptera* and *Asystasia*.

The next day (8th) I started northwards to the first freshwater stream, a thin flow of water over rounded muddy rocks covered thinly with moss. Here grew the fern

Nephrodium truncatum and there were abundance of the blue crab with white claws *Cardisoma carnifex.* This crab is only to be met with round these freshwater streams, and their presence shows the proximity of water. I found some however in the forest about a quarter of a mile from the Waterfall, where no water was visible above ground but there was said to have been a stream there at one time. This is the only crab eaten by the natives, who often bring baskets of them into the Settlement and even take them as far as Singapore. Leaving the wood I went along the coast for a considerable distance and found two more streams similar to the first. In many places the pandans which fringed the coast had been burnt evidently by fishermen to get at the sea cliffs for fishing, and they were often replaced by patches of the saltgrass. At one spot was quite a grove of fine Arengas, the ground beneath being almost bare of vegetation. Epiphytic plants are much scarcer in these shore woods than further inland. A few Saccolabiums only were seen. The grass *Ischaemum foliosum* so abundant on the cliffs of the North part of the Island, is very scarce on the East and South Coast.

On the following day I started with the Plant Collector for Steep Point, a great vertical cliff to the south, being especially desirous of finding "*Asystasia coromandeliana*" said to have been collected by Andrews there. As this plant commonly cultivated in Singapore occurs wild only in Africa and India it seemed highly probable that there was a mistake in the identification of Andrews' plant. I was quite unable to find a scrap of it wild or cultivated anywhere in the Island, but a very distinct species of the genus is abundant on the shore terraces near Waterfall and elsewhere. Having walked to the Whitebeach we made our way along the coast over the sharp pinnacles of coral reef to a stream bed coming down over basalt rocks but quite dry at that time. The rocks were covered with the prostrate fleshy-leaved *Pemphis* with tussocks of *Fimbristylis cymosa* in the hollows. Then we pushed through a very bad bit of thick scrub which had grown up since the whole of this place had been burnt about a year and a half previously. After climbing up a steep rock face on to a spur parallel to Steep Point, we found it was necessary to cross to the main hill through a dense mass of scrub composed chiefly of interlaced *Wedelia* over blocks and pinnacles of coral reef. It was intensely hot, and there was no shade, and the work was extremely arduous and exhausting. Then we had to force our way up the great masses of coral rock covered densely with pandans with cudrania and other climbing plants. The whole of this part of Steep Rock to the edge of the cliff is covered with great masses of rock with deep hollows between and covered with thick growth of climbers, Pandans and Ficus and other trees. After a short rest and a drink of cold tea quite inadequate to allay my excessive thirst we felled an Arenga Palm for the sake of the refreshing cabbage of the bud and sought in vain for the *Asystasia.* Another plant of the *Balanophora* was found, fruit of the big tree *Ochrocarpus,* and some other botanical desiderata. Then crossing the ridge northwards and descending a steep slope of loose blocks of coral reef we made our way across the upper part of the dried up stream, hoping to find water as the streams usually break out at the junction of the coral reef and basalt and then after a short distance go underground again. No trace of water was seen, but pushing on through the forest we met with the fisherman's track and in an hour or so got to the Waterfall and lost no time in slaking our thirst at the stream. There is doubtless an easier way of getting to Steep Point than either the way we went or returned, but it would be necessary to go a good deal further inland well above the source of the stream, and in any case it would be a stiff walk.

10th—Next day, we went along the coast to the South East, descending to the shore where it was possible, which it is at several spots, not far from the promontory which bounds Waterfall Bay on this side. The first descent was made over the basalt outcrop. The basalt here is somewhat columnar and in parts in balls or nodules surrounded and aggregated by crystalline carbonate of lime. A number of seaweeds, *Sargassum, Turbinaria,* etc., were collected in the rock pools and *Marisecus albescens* almost out of flower and burnt up by the drought was found, a new record for Christmas Island though it is one of the most widely distributed of sea-shore sedges. In another small bay were found three shells of nautilus, and a rhizome and several cut bamboos, which must have been drifted for a long distance there being no bamboo on the Island. The pieces of bamboo were all dry and the rhizome was probably dead when it reached the Island. Although I sought constantly for washed up seeds, etc., on the shores of the Island I could find very little. Seeds, dead, of *Terminalia Catappa* and *Guettarda speciosa*, both common plants on the sea coast and one broken shell of a seed of *Pangium edule* a native of Java were all I could see. Drift wood was also not common. Perhaps when storms occur more seeds and wood are drifted across from Java and elsewhere. Many years ago I received from Mr. Ross an extensive series of seeds drifted up on Cocos Island and one can hardly doubt that many of the trees and shrubs inhabiting Christmas Island are descended from seed drifted there from more distant localities. I was, however, surprised to find so few drift seeds on the beaches. After dark a Malay man captured a large yellow tabby male cat, which said to have escaped a few years ago from an European had become feral. It was extremely savage and bit and scratched the Malay severely, having grown very large and powerful. Although it had been for some time in the forest it had not wandered far from the Waterfall Settlement, and though there was plenty of food in the way of rats and birds in the forest, it had become a nuisance by killing the chickens belonging to the coolies. After it had been confined in a box for a short time it became quite tame again and before we left was quite quiet and merely kept on a string to prevent its taking again to the woods. When Andrew's book on Christmas Island was published there were no cats on the Island and he deprecates their introduction on the grounds that if it were to increase to any extent the sea-birds would probably be destroyed or diminished in numbers. There are plenty of cats on the Island now but except this one it does not appear that any have taken to the forest, and should they do so they are more likely to destroy the ground pigeon, thrush and whiteeye which are more terrestrial birds than the seabirds which only roost in the higher branches of the big trees and never come low enough for a cat to catch them. Far more dangerous would be the introduction of the civet cats (*Paradoxurus*, etc.,) as these animals are arboreal and would cause great havoc with the pigeons which they could easily catch. Malays often carry these animals about as pets and some one might perhaps introduce a pair, which would be very regrettable.

On October 11th we all returned to the Settlement, On the way I found *Pittosporum nativitatis* in flower for the first time. It is a common little tree on Phosphate Hill and parts of the plateau. The fully developed inflorescence is not as compact as it is figured and described in Andrews' book. It is a short but well branched panicle. The butterfly *Junonia villida* was first seen this day, and thence till we left was common though very active and difficult to catch.

Next day was occupied in collecting along the Cemetery Road, and at low tide in the afternoon in collecting seaweeds, shells, etc., on the reef in the Cove. The first *Hypolimnas misippus* was seen this day after which it became very abundant, evidently bred in the Island as the specimens were in excellent condition. Two days later a white butterfly *Pieris* sp. appeared. Specimens were caught later. It was not previously recorded from the Island. The next two days were spent in collecting round Rocky Point, Phosphate Hill and the Cove, and packing live plants to transit to Singapore by the "Islander" which had arrived. The whole of the neighbourhood was so dry that not only orchids but palms and ferns were sent dry in wooden boxes and arrived safely and in good condition.

On the next two days arrangements were made for an expedition to cross the Island over Murray Hill to the West Coast were at Hugh's Dale it was expected to find water. No one on the Island apparently had ever been to Murray Hill by that route, but there was a track for some way known as the Murray Hill Track, starting from a little beyond Irvine Hall. Accordingly tents and provisions were brought to Irvine Hall, and with a number of Chinese coolies the expedition started on Monday morning 17th at 8 o'clock, Mr. Macpherson and Messrs. Jones and Jackson of the Phosphate Company accompanied the expedition and they with myself preceded the coolies to cut the track and blaze the trees. The track is quite level and goes due west at first and except for a few big fallen trees could be used by ponies, but it was more overgrown further on. At 3 o'clock we cleared a piece of forest and pitched camp, the coolies and Messrs. Macpherson, Jones and Jackson returning to the Settlement.

18th—Messrs. Jones and Jackson came up about 9 o'clock, but the coolies delayed so long that they did not arrive till 1 p.m. We then went on for about 1½ hour and pitched camp again. Messrs. Jones, Jackson and I went a long way on what was supposed to be the right track starting from a spot where encampments had previously been made and where there were traces of four tracks going respectively south, south west, north west and north. The Southwest Track well marked, was the one taken. The yellow *Ipomea* was very abundant here, and very showy. From the old encampment, supposed to have been used by Ross, one of the party affirmed he saw the sea to the south. The track went southwest chiefly and descended to about 700 feet. The coolies were sent back to the previous camp for the night to come on in the morning. *Birgus* was more troublesome this night, coming into the tents several times. One stole a saucepan, others took away old tins. Pigeons were abundant here, and the hawk is not uncommon. Our water supply was rather short and had to be used with care, and only for drinking and cooking. Close to where the camp was pitched we came upon the very fine *Hibiscus* (*abelmoschus*) *Vrieseanus* a tall herb about 12 feet tall densely covered with pungent bristles and with large yellow flowers with a deep claret coloured eye. Also a number of plants of a small ground orchid *Zeuxine* and a single plant of a saprophytic orchid *Didymoplexis; Dendrobium* was common here and a *Thelasis* apparently identical with a Javanese species was found on fallen boughs of trees. *Ipomea peltata* with its large yellow flowers was climbing up the smaller trees. The common plateau trees, *Eugenia*, *Sideroxylon*, *Barringtonia*, *Laportea* with *Randia* formed most of the forest, and *Guettarda* and *Ochrosia* which do not generally occur on the plateau were both here. A little rain fell during the night. The robber-crabs, *Birgus latro*, invaded the tents and stole a boot, and a killing bottle, which was found next day broken under a pile of cut bushes.

19th—Messrs. Jones, Jackson and I with Kassan started early, leaving the coolies to follow along the track we had marked yesterday. After a short way we noticed we were descending, and eventually the track disappeared, pushing on we came to a ridge of phosphate of alumina and iron, a curious rock resembling sandstone at first glance. This is the rock abundant at Murray Hill. We then came to an old encampment with a bucket, a tin, a grindstone and a pair of shoes, evidently a very old encampment. The ground descended very abruptly to an old stream bed. We appeared to be near the sea but there were no tracks or blaze marks. As it was obvious we were not near Hugh's dale, we pushed on to find out where we were, and at last got to a cliff edge from which the sea could be seen at our feet. We were on the top of the upper terrace of the south coast about two miles from Egeria Point. The view of this point never yet reached by anyone as far as is known was very fine. The immense vertical cliffs densely covered with trees ran in a curve to the point where we were, Below them was the shore terrace, with at one point as far as could be judged an outcrop of basaltic rocks. Immediately below us was a great densely wooded gorge. It was obvious that no water was to be found here, and it seemed impossible to descend these precipitous rocks. A message was sent back to the Settlement for more water as very little remained. The coolies were sent back and we camped for the night. The forest here was botanically poor, the only plant of interest being *Melochia arborea* of which a large tree was seen over the precipice. Pigeons were abundant. Dr. Hanitsch took photographs of Egeria Point and of a booby on its nest among the rocks. The *Birgus* was abundant here, and constantly entered the tents at night One seized a towel while dinner was being cooked and during the night one conveyed outside the tent a bottle of quinine lying near my head. It was found open but unbroken a short way off.

20th—We decided to retreat to the Settlement without delay leaving the baggage to be fetched by the coolies who would be sent, as there was hardly any water left, and none to be got nearer than Irvine Hall, and all but Dr. Hanitsch who wished to remain till the arrival of the coolies, and his boy, started at daybreak. Messrs. Jones and Jackson went ahead and met the coolies near the first camp and came back with them. I went to the first camp and remained there till the coolies returned, collecting plants in this district. More *Didymoplexis* and *Balanophora* were found. The whole party having reached the first camp about 2 a quick march brought us clear of the forest and into the settlement before dark. The whole distance appeared to be about 15 miles. As ships were now expected in every day, it was impossible to procure the service of any more coolies till the end of our visit as all were wanted for loading the vessels.

21st—The morning was occupied in changing the herbarium papers and a short walk to Smith Point to try and get more of the Selaginella, but I was not successful. *Heptapleurum* was just coming into flower, though it had shewn no signs of buds before we left the Settlement. Another *Laportea* was also flowering, and a large tree with panicles of yellowish berries and very dark green leaves was met with and eventually with some difficulty as the tree was too thick to climb Kassan got specimens of it. In the afternoon I went to Irvine Hall to bring down some large fruits of the big *Pandanus*, I had left there, and Dr. Hanitsch to Phosphate Hill to fetch away some fossils, etc.

22nd—I went along the rocks beyond Smith Point as far as was possible. It was extremely hot and the vegetation somewhat dried up, so much so that the younger trees of *Ochrosia* were often quite withered the whole day not recovering even after the nocturnal dews. Many of the smaller plants such as Capsicums were also drooping even in the woods. On the rocks beyond Smith Point was a pubescent stunted form of *Physalis minima* looking very different from the tall glabrous plant common in cooler and less rocky spots. In the afternoon among other things the climber *Limacia* n. sp. was found in flower for the first time.

24th— Went up to Irvine Hall with my boy, Kassan, and two boatmen and a gardener to stop there the night and start early for the Murray Hill Track next morning. Accordingly started at 6.15 and walked fast to Ross' camp and started from there along a track to the Northwest, at the commencement of which was an inscription in Chinese stating that it was the road to the big hill and place for water. The track immediately disappeared and the woods proved very dense. Here I noticed upwards of a hundred Birgus beneath an Arenga devouring the fruit. They had eaten almost every seed rejecting the pulpy outside cracking and eating all the seeds with their powerful jaws. After pushing a long way and finding no track or rise, I thought it advisable to return and found the men behind had neglected to mark the track properly, so that we had some difficulty in finding the way back. After a short rest returned to Irvine Hall and after a cup of tea back to the Settlement. The whole time occupied in walking was ten hours and a half. It is clear that it is practically impossible to get to Murray Hill and back in the day, unless the track was specially opened beforehand. A few specimens of various plants were obtained and the phosphate rock again met with. *Dentrobium* sp. was in flower.

Next day I went to North East Point collecting flowers of *Pisonia excelsa* which are white and scented like almonds, and *Croton caudatus*, just coming into flower.

26th—To Andrews Lookout, crossing Phosphate Hill. Here I found large trees of *Spondias* in flower with fruits also. The trees were too big to climb but we were able to find fallen sprays of flowers and plenty of fruit and to get leaves. *Premna lucidula* a small straggling tree was in flower as was *Crinum asiaticum* but this latter on the face of the precipice was inaccessible. A fine cycad was seen in the wood growing on a rock.

27th—To the foot of Tom's Ladder in Flying Fish Cove, where *Polypodium Phymatodes* new to the flora was found growing on the cliffs of coral reef, but only a few plants. The way along the foot of these cliffs is troublesome being a steep mass of coral reef talus, after passing which one comes to the outcrop of basalt and ash, with a talus of fine dust often difficult to cross. It was extremely dry here and many of the plants were quite dried up. This is the only place at which I found the peculiar grass *Panicum Andrewsi* which was almost quite withered up. The pink flowered *Boerhaavia* grew upon the rock faces. To add to our difficulties at one place stones were falling from the top of the high cliff. Finally coming to in impassible precipice I descended by a long slope to the Cove.

The next day the "Islander" arrived I walked over to the Waterfall and got *Ipomea biloba* in flower and *Nelochia* also. The 29th was spent chiefly in collecting plants for cultivation near Tom's Ladder and while so doing I found a single plant of the rare *Asplenium* on the cliff there. Next day explored the cliffs behind the Cove further towards the East, but got but little of interest. Part of this route requires careful climbing as the rocks are often loose and dangerous. A very large rock shifted its position while I was passing it and fell on my leg, but I fortunately managed to get from under it as it fell and escaped with a deep bruise, otherwise it would certainly have broken my leg. Further on we came to a spot where by the aid of fig-roots it is possible to climb up to the plateau where there is a track leading to the pipe-line and so to the Settlement.

28th—The first rainy day since our arrival, raining almost all day. The "Islander" left the next day for Singapore. There were heavy rollers for the first part of the day and steady rain for most of the voyage which ended at about 7 p. m. on November 2nd.

The Botany of Christmas Island.

The first collection of plants made in Christmas Island was that of the expedition of the Flying Fish under Captain Maclear, in 1886, but a few plants only were then obtained. In 1887, H. M. S. Egeria visited the island and remained ten days during which time Mr. J. J. Lister, naturalist to the expedition, collected plants, animals, and rocks but was unable to penetrate into the centre of the island. The account of the plants obtained on these two expeditions was published by Mr. Hemsley in the Journal of the Linnean Society vol. XXV p.351. They amounted to about 52 specimens of flowering plants, 17 Ferns and Lycopodiaceae, and 8 cellular cryptogams As previous to this time no settlement had ever been made on the island nor any ships except a few whalers, and other vessels touched there, the flora was in its unaltered primitive state and no weeds of cultivation had made their appearance. The collection however was by no means complete even for the area visited, but many of the endemic plants were collected.

In 1888 (November) Mr. Clunies Ross settled there, and from this period dates the introduction of the weeds and plants generally introduced by human agency.

In 1890 I visited the island in the gunboat "Redpole" landing at Flying Fish Cove, and spent about 10 hours there, during which time I collected as many plants as I could, in the Cove and up as high as the Plateau. As I was chiefly interested in the indigenous plants at that time I paid less attention to the introduced species, but noted *Hibiscus abelmoschus*, and *Spilanthes acmella* neither seen since; *Paspalum sanguinale* and *Eleusine-indica*. An account of this trip was published in the Journal of the Straits Branch of the Asiatic Society, vol. 22, p.123.

During their residence the Ross family introduced a number of useful and ornamental plants many of which are still to be found in the Settlement and with these a number of weeds must have been introduced.

In July 1897 Mr. C. Andrews, visited the island and remained for upwards of a year, during which he made extensive collections, and explored a good portion of the island. The account of his expedition appeared in 1900 as "a Monograph of Christmas Island" published by the trustees of the Britsh Museum. He added a large number of species to the known flora; many indigenous ones, and about a dozen introduced plants or weeds which had more or less established themselves.

At that time clearings were being made and roads cut, and since the opening up and development of the Phosphate quarries, there has been an influx of Chinese, who have brought in their train a number of cultivated plants and weeds. Practically however the greater part of the island is quite unaffected by these arrivals, which have only spread in Flying Fish Cove, along the Cemetery road, and round the Phosphate hill quarries, and also on the cleared ground at the waterfall. At the time of Mr. Andrew's visit no herbivorous animals except one goat had been introduced, but since then a few cattle and some horses have been brought, and these perhaps are responsible for the appearance of some weeds, such as *Amaranthus viridis*, and *Panicum colonum* which not rarely spring up where the dung of these animals is dropped. In the collections made by myself in 1904 there are a number of introduced weeds not obtained by Mr. Andrews, as well as some indigenous plants which were either overlooked by him or not in flower at the time of his visit.

The collection although made at a very dry time of the year, as not a drop of rain fell till quite the close of our visit, contained nearly all the flowering plants and ferns previously collected, as well as the novelties alluded to.

The plants not seen by me on this occasion were *Spilanthes acmella* and *Hibiscus abelmoschus*, introduced and fugacious weeds; *Cerbera odollam* found by Andrews at Rocky Point, which has since been much cleared for coolie lines, and the tree perhaps destroyed; *Remusatia vivipara* in the old path to Phosphate hill, which has perhaps been destroyed by the formation of the tip for the Phosphate, at the end of the tram lines, or the plant may still be there and simply dried up at the time of our visit for I sought carefully for it in vain. *Lastræa intermedia* collected by Lister, and apparently not by Andrews I did not see, nor *Sagenia polymorpha* found by him, not common at North West point, a locality I could not get to. Some other plants mentioned in previous lists are obvious and others doubtful misidentifications. Lister's collections are preserved at the Royal Gardens Kew and Andrews' at the British Museum and I have not had the opportunity of seeing them.

The collections made in 1904 included as can be seen a good many additions to what was previously known and contained the first collection of marine Algae from the island. It is only possible to get to the sea in a very few places, on account of the height of the cliffs, and the impossibility of using a boat with any degree of safety. In many places from the top of the cliffs one can see the rocks beneath the surface clothed with masses of *Turbinaria*, *Sargassum* and many other Algae, far out of reach, and doubtless there ar e many yet to be collected. I have to thank Mr. and Mrs. Gepp of the British Museum for identifying the Mosses and Algae, and some other plants. The fungi and some of the Lichens were identified by Mr. Massee of Kew Gardens and other plants by Mr. Hemsley of Kew. A few plants were met with without any trace of flowers or fruit, one a shrub closely resembling *Clerodendron neriifolium* near the waterfall; a big liane common in the forest; and a small tree with lanceolate leaves common on the plateau, and of *Tristiriopsis Nativitatis* very common in Flying Fish Cove and which was first collected in fruit by Lister and again in fruit by me, the flowers are as yet unknown.

I do not think it at all probable that the whole of the flora even of the flowering plants and ferns is yet known. Many of the indigenous plants were very local, and considering the large area of the island which is practically inaccessible as yet, especially the south coast, and the fine cliffs of Egeria point, one may expect that a number more plants will be found whenever it is possible to explore these parts, and even in the more accessible parts it is probable that many small plants wlll be met with which were dried up at the time of our visit.

Native Names. Mr. Andrews in his account of the flora gave a number of native names which he had obtained apparently from the Javanese temporarily employed on the island, but these are of little importance, as nearly all are either blunders by ignorant natives or expressions made up on the spur of the moment. Thus *Pongamia*, well known as Malapari is called Kayu Kwat, simply "strong wood." *Ochrosia* is given as "Gundra Roussa" presumably a blunder for Gendarusa, (*Justicia Gendarusa*) from some fancied resemblance of the leaves to those of the *Justicia*; *Berria Ammonilla* is given as Boognor, but it is really known in the island as Bungoh i.e. *Lazerstrœmia*, no doubt on account of its hard wood; *Pisonia excelsa* is called Jamboe (i.e. Jambu), that is an *Eugenia* (*Jambosa section*). No Malay who knew anything about the plants would make such a mistake as this if he saw the tree, nor would he call *Kleinhovia* Laban i.e. *Vitex pubescens*. A few of the names of very common and well known plants are correct Javanese names, such as Ketapan, Waroo, Dadup.

Distribution of the species. In giving the distribution of any given species of plant, writers are apt to be very casual in their localities, Malaya for instance is by some authors made to cover anywhere from Tenasserim to the Philippines, including three or four quite distinct floras, and plants are described as "widely spread in tropics" when in fact their area is circumscribed to a small portion. The importance of distributional notes depends entirely on their accuracy and their value consists in the light that they throw on the origin of the flora. Comparatively little literature and herbarium material is at my disposal as I write this, but I have given as many distributional notes as I can get, and tried to distinguish indigenous plants (i.e. plants which have arrived at the locality without the direct or indirect aid of man) from those which have been so introduced which I class as *weeds.* In order to make the distinction clear, I have given in all important cases the date of the first collecting of these plants. The earliest list, that of Lister published in 1888 in the journal of the Linnean Society, though only a small collection, contains only two plants which one would suspect to be weeds, viz: *Datura*, and *Fleurya.* There is absolutely no evidence of any one's having settled on the island previously to the visit of the Egeria. There may have been wrecks, and doubtless there were and whalers had touched at Flying Fish Cove. Dampier sent a boat on shore on the south west point. But these visits would not be likely to bring introduced weeds, like *Datura* and *Fleurya*, which seem only to occur round Flying Fish Cove, and not in the further side of the island where most of the earlier landings seem to have been made. We may take it then that all the plants collected by the Flying Fish and Egeria parties are indigenous, and Christmas Island may be considered the only Oceanic Island of which the flora has been collected when in its original state and before the appearance of man and his concomitant weeds.

The settling of the Ross family not long after dates, the first invasion of weeds. Mr. Ross brought many plants to cultivate both useful and economic. Whether in pots of soil or packing or in other such ways, a number of weeds arrived, most if not all these came from Cocos Island and Java. A number of these were seen or collected by myself in 1890, but the few hours at my disposal on that occasion were more devoted to the indigenous flora. More weeds had appeared by the time Andrews made his visit, and about then commenced the influx of Chinese, who often carry pot plants about with them, as well as vegetable seeds, etc. Then cattle and horses were imported, and these added yet more weeds, both in fodder brought with them and in that which they had eaten on the way. Thus I found in 1904, more weeds than Andrews had collected.

These weeds though in many cases very abundant now in the Settlement and the clearings on Phosphate hill and by the waterfall have not spread to any distance beyond, not even along the fishermen's regular routes.

The following is a list of weeds of the island, (excluding plants merely planted intentionally which have spread of themselves such as Papaya, Capsicum and Melia) arranged according of the date of their first record.

1890.

Hibiscus abelmoschus.
Spilanthes acmella.
Panicum sanguinale.
Eleusine indica.

1897.

Gynandropsis pentaphylla.
Ageratum conyzoides.
Synedrella nodiflora.
Ipomea digitata?
Solanum ferox.
Stachytarpheta indica.
Enphorbia pilulifera.
Phyllanthus Niruri.
Trema amboinensis.

1904.

Cleome viscosa.
Cardiospermun Halicacabum.
Ludwigia prostrata.
Turnera ulmifolia.
Ipomea chryseides.
Amaranthus viridis.
A. paniculatus.
Peperomia exigua.
Euphorbia thymifolia.
Cyperus Iria
Paspalum conjugatum.
Panicum colonum.

Setaria glauca.
Pteris quadriaurita.
Solanum involucratum.

Melia azederach, *Carica Papaya* and *Capsicum minimum* introduced doubtless by the Ross family have also spread freely over cleared and partly cleared ground in the neighbourhood of the settlements being dispersed by birds, but are absent from the further parts of the island.

The indigenous flowering plants number about 125 of which 29 are distinct enough to constitute endemic species, with 26 Vascular Cryptogams including 3 endemic species, and 85 terrestrial cellular cryptogams.

ENDEMIC SPECIES.

These are the following.

Limacia nativitatis.
Pittosporum nativitatis.
Abutilon Listeri.
Grewia osmoxylon.
Grewia insularis.
Acronychia andrewsi.
Tristiriopsis nativitatis.
Colubrina pedunculata.
Eugenia gigantea.
Zehneria alba.
Heptapleurum natale.
Saprosma nativitatis.
Hoya aldrichii.
Ardisia pulchra.
Asystasia alba.
Dicliptera Maclearii.
Peperomia Rossii.
Claoxylon caerulescens.
Laportea Murrayana.
Cryptocarya nativitatis.
Dendrobium pectinatum.
Phreatia Listeri.
Ph. congesta.

Saccolabium Archytas.
Corymbis angusta.
Zeuxine exilis.
Arenga Listeri.
Pandanus nativitatis.
P. elatus.
Panicum andrewsi.
P. clivale.
Asplenium centrifugale.
Gymnopteris Listeri.
Selaginella rupicola.

Moss.

Ectoprothecium micronesiense

Fungi.

Favolus albidus.
Geaster andrewsi.
Poria chlorina.

Alga.

Halymenia polyclada.

The affinities of these plants may be said to be with Javanese species except *Cryptocarya* and *Pandanus Nativitatis,* which are allied to Australian and New Caledonian species.

As Oliver (Journ. Linn. Soc. l. c. 352) remarks "most of the plants could not be exactly matched with their congeners from Java but yet do not sufficiently differ to be specifically distinguished, an indication of considerable age of the flora," and indeed this is so, for besides these distinguished as distinct species several others are very unlike the plants as we know them from surrounding countries, eg., *Randia densiflora, Callicarpa longifolia, Ochrosia Ackeringae* and *Leea sambucina.* Still it must be taken into consideration that the locality where these plants grow is very unlike their habitats in Java and the Malay Peninsula. The soil is very rich in phosphates and lime, and extremely porous, so that in the dry season it becomes extremely dry, the water soaking through the ground till it reaches the basalt. Many of the plants grow on bare rocks of coral reef, others in masses of coral detritus. What wonder that plants growing on such soils and with such a climate should differ from those growing in permanently wet woods with rich humus and little lime and phosphate. Compare the damp dark forests rich in humus with little lime which *Carymbis veratrifolia* inhabits with the dry powdery dust of phosphate of iron and alumina and broken coral reef in which *C. angusta* grows; the damp clay banks where *Asystasia intrusa* lives, with the coral talus which *A. alba* frequents; the low lying damp open country inhabited by *Callicarpa longifolia* with the plateau woods where the variety *glabrescens* grows and one can not wonder these forms are very distinct.

It must be remembered that we have as yet no complete knowledge of the floras of the adjacent islands, and it is probable that some of these endemic species will be found again in other Malayan islands. Some of the plants indigenous to Christmas Island and not classed as endemic are as yet only known to occur in one other spot, e.g. *Balanophora insularis* and *Dendrocolla carinatifolia* in Pulau Aur, an island lying off the eastern coast of Pahang, and *Sideroxylon sundaicum*, on Pulau Sangian.

The greater number of the indigenous species however differ little or not at all from the forms known elsewhere, though there seems among the trees to be a tendency to greater size, probably due to some extent to the absence of competition, of the plants found elsewhere than in Christmas Island, nearly all have been recorded from Java. The exceptions are.

Ochrocarpus ovailfolius	Admiralty Islands and Timor Laut
Strongylodon ruber	Andamans, Ceylon and Polynesia.
Inocarpus edulis	Polynesia.
Quisqualis indica	Burma, Malay Peninsula.
Blumea spectabilis	India, Ceylon, Malay Peninsula.
Sideroxylon sundaicum	Pulau Sangian.

Ochrosia ackeringæ	Sumatra and Banka.
Convolvulus parviflorus	Africa, India, Ceylon and Australia.
Ruellia ringens	E. Africa, India, Malay Peninsula.
Balanophora insularis	Pulau Aur.
Acalypha wightiana	Malay Peninsula.
Dendrocalla carinatifolia	Pulau Aur.
Ischæmum foliosum	New Caledonia.
Fimbristylis cymosa	Australia.

It is probable however that several of these will be found to occur in Java.

Cultivated Plants on Christmas Island.

I made a note of all the plants I saw cultivated on Christmas Island, especially nothing those useful as fruit or vegetables. The importance of these to the coolies working on the Island as well as to the Europeans need not be dilated on.

The fruit trees included :

Pomegranate (more valuable perhaps for its anthelmintic roots). Custard-apple, Bullock's Heart, Sapodilla, Pumelo, Orange and Limes, Papaya, Pineapple (Mauritius pines only), Tamarind, Coconut, Lime-berry and Bananas. All fruit well here, and there was a good supply of most of them. The limes and orange trees were however much attacked by scale insects. Directions for cleaning them were given to the Manager. Mangosteens had been planted and I heard also that Durians had been introduced. A few dying mangosteen seedlings were all I saw. Soil and climate is not suitable for these. Of other fruit trees were single specimens of Jambu Bol, Jack and Mango, none of which had fruited. Coconuts grow and fruit well in the Cove and appear sufficient in number to supply all local needs.

Vegetables. The Chinese have one or two gardens for vegetable cultivation in which grow Dolichos Lablab (Karas bean) Kachang Prut Ayam, Luffas, Waxgourd, Bottlegourd, Peria, Chives, Chinese lettuce, Kangkong, Bayam, Sweet-potato, Brinjals and Indian Corn; Chilies have run wild everywhere. Dal and Haricot beans, mentioned by Andrews as cultivated I did not see and of other plants in cultivation mentioned by him Sugar-cane, Bamboos, Nutmeg, and Cocoa, have also disappeared. The dry calcareous soil is not suited for these plants. A few ornamental plants are cultivated but more might be done in this way. There are a few good trees of Kapok, a candle-nut tree, Liberian Coffee, doing well but the trees are getting old. Lemongrass, and a good supply of Tapioca. The attention of the Magistrate was called to a number of thriving plants of the very undesirable Indian Hemp (Ganja) close to his house carefully planted and protected by his gardener.

Fodder plants for the horses and cattle are practically restricted to *Oplismenus undulatifolius* which is abundant in many of the woods and is collected and brought in by the grass cutters. There is also *Digitaria sanguinale* and I also found recently introduced *Panicum Colonum* and *Paspalum conjugatum* both in very small quantity. The latter when it gets to the cooler and shadier parts of the island will probably spread, and is a good fodder grass. The rest of the grasses in the island are unsuited for fodder. The horses however eat greedily many of the weedy herbaceous plants such as *Synedrella* and *Ageratum* when young. More might be done in introducing fodder plants as there seems rarely to be sufficient. The soil in a good part of the island is hardly deep enough for much cultivation, but behind the Settlement is a good area tolerably flat in parts of rich brown earth, in which beans, pines, bananas, etc., grow well. A good deal of this is still covered with secondary scrub which could be cleared and used as a fruit and vegetable garden. The difficulty of cultivation in the dry island lies in two factors, the excessive drought in the dry season, accentuated by the porous nature of the soil which does not retain water, and the great mist of sea spray which covers the Cove, and the cultivated area at the Waterfall during the rough seasons. At the latter place where sweet-potatoes were being cultivated the natives told me that the plants were destroyed every year in the stormy season by the heavy masses of sea spray thrown up by the waves.

The peculiarity of the soil very rich in phosphate, and lime also must be unsuitable for many plants. The area at present available for cultivation of any trade products is too small for more than experimental work, but a good many more vegetable and fruits might be successfully grown. I brought and gave to Mr. Macpherson who took a good deal of interest in plant cultivation, suckers of pine-apples, and seeds of the cherry tomato. This plant had run wild in Fernando de Noronha, an island very similar in many respects to Christmas Island, just as the Chili has there, and its small sweet fruits were found to be very refreshing, and could be gathered in basketsful from the rocks among which it grew. The birds in Christmas Island would soon disperse the seed and it would probably soon become abundant. The only wild eatable fruits on the island are those of Sideroxylon which somewhat resemble cherries and the kernels of the Ketapang and *Inocarpus edulis*, the Otaheite chestnut, which I was somewhat surprised to find no one on the island seemed to know was eatable. When boiled it has quite the taste of a Spanish Chestnut but it is very much larger.

The following is a list of all the plants cultivated at present or previously recorded in Christmas Island. The amount of cultivated land is very small. A number of the plants in this list were introduced by Mr. Ross and others later by the employés of the Phosphate Company, of the trees I saw frequently but one specimen.

1. Fruit trees.

Punica granatum	Pomegranate, grows well.
Anona squamosa	Custard apple ,,
,, *muricata*	Bullock's Heart ,,
Mangifera indica	Mango. One tree not fruiting.
Artocarpus integrifolia	Jack. ,,
Achras sapota	Chicko, several fruiting.
Citrus decumana	Pumelo ,,

Citrus aurantium	Orange several fruiting.
Citrus medica	Limes ,,

The Limes of which there are plenty were at the time of our visit much affected by scale.

Garcinia Mangostana	Mangosteen, all dead the dry season and poor soil does not suit them.
Carica papaya	Papaw, abundant, good seed dispersed by birds.
Tamarindus indicus	Tamarind, several and young seedlings noticed along the waterfall trunk.
Cocos nucifera	In Flying Fish bay, two varieties fruiting well.
Ananassa sativa	Pineapple grows well. The Mauritius pine is the only variety there.
Triphasia trifoliolata,	Limeberry plentiful.
Musa sapientum	Bananas do well.
Eugenia Malaccensis	One tree.

2. Vegetables.

Dolichos Lablab	
Cajanus indicus	Dal. seen by Andrews.
Phaseolus lunatus	,,
Vigna Catiyang	Cultivated by Chinese.
Luffa sp.	
Benincasa cerifera	Waxgourd.
Momordica charantia	Peria.
Ipomeca aquatia	Kankong.
I digitata	Sweet potato.
Lactuca sp.	Chinese lettuce.
Allium scorodoprasum	Climes.
Lagenaria sp.	Gourd.
Solanum Melongena	Brinjal, yellow variety.
Capsicum minimum	Chilies established in various places.
Zea Mais	Indian corn grows well.
Andropogon nardus	Lemon grass.

3. Ornamental and other plants.

Aleurites moluccana	Candlenut. One tree Ross' old house.
Oreodoxa regia	

Elaeis guineensis	oil palm.
Livistona australis	
Cycas revoluta	
Phoenix sp.	Young plants.
Fourcroya gigantea	Two young plants.
Poinciana regia.	
Caesalpinia pulcherrima	
Plumiera acutifolia	
Hibiscus rosa-sinensis	
Cassia siamensis	
Canna indica	
Jatropha curcas	
Jasminum Sambac	
Renanthera arachnites	
Vanda Hookeriana	
Melia azederach	has spread all over the Cove, and as far as Phosphate hill, giving a great part of the secondary scrub.
Codiaeum variegatum	Croton, a few bushes.
Eriodendron anfractuosum	Two or three trees.
Cannabis indica	
Coffea liberica	does well.
Manihot Utilissima	Tapioca.

The Nutmeg and Cocoa and the Sugar Cane and Bamboos formerly cultivated have quite died out.

NOTE ON THE TIMBERS OF CHRISTMAS ISLAND.

The Bastard Teak (Berria sp.) is of course the most valuable timber of the island, but though a good deal still exists, the supply is not inexhaustible, as it appears only to occur on the lower terraces on the North Coast. It hardly occurs on the plateau and I saw it not on the other coasts. The timber of the Eugenia, the biggest tree on the island is fairly good but is not what would be classed as a first class wood. *Sideroxylon* has a white wood, good for planking, etc., but not as good as the wood of most trees of the order, *Sapotaceae. Cordia*, the iron wood of Cocos Island, is a first class wood but the trees are scanty and small here. *Ochrosia, Pongamia* and *Cryptocarya* also give useful words. The Katapang is larger here and with harder wood than I have seen elsewhere. In fact it appears to be too hard for practical purposes. The so called wild coffee, *Randia densiflora* var. supplies excellent walking sticks and umbrella handles, and as there is often a considerable demand for these they might at some time be an article of export.

THE COLLECTION MADE:

Considering the time at our disposal and the difficulty of getting to further parts of the island a very complete collection of the flora was made which not only added a very large proportion to the plants previously known, but has enabled me to correct a number of misidentifications in previously published works, of previously unrecorded species; a certain number, not very large, were plants introduced accidentally after Andrews' visit; the others were plants obviously overlooked by him. I do not think that even yet we have got a full list of all indigenous species as it is probable that in the at present inaccessible parts of the South and West other plants will be found. I met with three trees and shrubs not previously noticed by other collectors on which no trace of flowers or fruits could be found. They were quite common but I failed to identify them, and doubtless there are others in further parts of the island. A large number of fungi too were collected which had not previously been recorded and others of this group will probably be met with in more suitable time of year.

The greater part of the flora is however known now.

THE FLORA DICOTYLEDONS.

MENISPERMACEÆ.

Limacia nativitatis, n. sp.

A tall woody climber with slender branches. Leaves (young) elliptic orbicular, (older) lanceolate subacute mucronate 2-3 inches long 1½-2½ inches wide above glabrous dark green beneath pubescent with yellowish hairs especially dense on the midrib, nerves ascending 2 pairs petiole 1 inch long geniculate densely pubescent. Racemes 3 inches long not branched slender, rachis pubescent. Flowers yellow in distant tufts of 5 or 6, shortly pedicelled. Bracts linear pubescent. Sepals 6, 3 outer ones linear spathulate pubescent, 3 inner ones broader obovate obtuse, pubescent on the back. Petals smaller sub-spathulate glabrous. Stamens 6 glabrous, 6 filaments broadly linear, anthers introrse 2 celled, grooved. Fruit not seen.

Common near Flying Fish Cove and towards Rocky point and on the Plateau.

The plant which climbs on the smaller trees covering them with a thick mat of foliage, only came into flower shortly before we left, and I only obtained male flowers.

It seems most nearly allied to *L. borneensis* Miq. and is remarkable for its simple racemes of flowers.

The genus *Limacia* entends from Tenasserim and Cochin China to the Malay peninsula and archipelago. The fruits are drupaceous.

Tiliacora racemosa forma, is given without special locality in the Monograph of Christmas Island. It is an Indian plant. I have not seen it here and would suggest the plant referred to this species may perhaps be the preceding.

CAPPARIDEÆ.

Gynandropis pentaphylla, Dec.

Pedicellaria pentaphylla Schrank.

Was collected in the settlement by Andrews.

Cleome viscosa, *L.*

A few plants were met with on the coral beach in the Flying Fish Cove.

Both of these tropical weeds occur occasionally in cultivated ground, and often disappear again as quickly as they come.

CRUCIFERÆ:

Sinapis nigra, L.

I found a single stunted plant of what appeared to be this in waste ground near the quarries on Phosphate hill evidently an escape from cultivation.

PORTULACACEÆ.

Portulaca oleracea, L.

The common Purslane is abundant in Flying Fish Cove and also at the Waterfall.

This plant was not obtained by any of the previous collectors and is probably a recent introduction. It is a widely distributed weed occurring in all warm countries on sea shores and sandy or open places. It is described by Hemsley (Voyage of the Challenger, Botany vol. I. p. 35) as certainly sea-dispersed, and so it seems to be as it occurs on almost all oceanic islands, but it is also apparently carried about accidentally by man, and then readily spreads, as it is often abundant in estates and waste ground where there seems no other reason for its presence. Hemsley talks of it too as a cultivated plant, and thinks that its wide distribution may be due to that cause. I have never seen it cultivated in the East, nor used by any native race for food, certainly neither Chinese nor Malays eat it here so still less do they cultivate it. Into Christmas Island it certainly seems to have come as an accidental weed, as it did not occur in any place where other weeds had not already come, or where there had not been some cultivation close by. I do not know whether it has ever been recorded that this plant closes up its leaves at night, like *Phyllanthus* and other such plants.

PITTOSPOREÆ.

Pittosporum nativitatis Baker, was described in the Monograph of Christmas Island p. 171, fig. XVII, from plants collected by Andrews on the plateau on the East Coast. It is abundant on the upper terraces at the cemetery, and Phosphate hill and also on the Plateau. It is a small tree 12 to 14 feet tall, with the foliage much like that *P. ferrugineum*, common, near the sea and in dry placcs inland. The flowers as described by Baker are in compact heads at first but the panicle opens out later and is nearly as wide as that of *P. ferrugineum*. They are of the same yellowish white colour as those of that species. It appears to be fertilized by wasps.

The fruit is a capsule and appears to resemble that of *P. ferrugineum*, the seeds of which are dispersed by birds.

GUTTIFERÆ.

Ochrocarpus ovalifolius, T. Anders.

A large tree with very coriaceous oblong dark green leaves, and white flowers solitary or in pairs on the bare portion of the branches below the leaves. Fruit oblong conic eventually brown.

Abundant on the first terrace from North East point to steep point, collected on the East Coast also by Andrews. The plant, known as Nyamplon, much suggests *Calophyllum* in habit, but with much larger leaves. The fruits are probably sea drifted. I found a number of them under a rock in the woods at the waterfall which had been carried there and eaten by rats. *Ochrocarpus ovalifolius* is a native of the Admiralty islands, Timor Laut and Pulau Sangian .

Calophyllum Inophyllum, L.

This common sea shore tree is not as plentiful as would be expected in Christmas Island being confined so far as I saw to the vicinity of the waterfall, where there were a number of tall trees of it. It was not in flower at the time of our visit, but weeds and fruit were obtained. The locality was on the basaltic out crop or very close to it, and it was probably due to the volcanic soil or to the neighbourhood of subterranean water that it grew there. This tree is common in the

Polynesian Islands, Malay Archipelago, and Peninsula, India and Mascarene Islands, and is always to be found near the sea, though it will grow in open country inland. The seeds are often drifted about in the sea, but are dispersed inland often by fruit bats.

MALVACEÆ.

Malvastrum tricuspidatum, A Gray.

A low shrubby plant with buff yellow flowers, occurs in Flying Fish Cove. It was also collected by Andrews. I saw it nowhere else. It is widely distributed but absent from many places, occuring in Africa, India, Australia, Cocos, and South America, probably introduced in some of these localities.

Sida spinosa, L.

An erect shrublet with buff yellow flowers grew also in Flying Fish Cove near the last species and I also found it along the cemetery road. Not previously recorded. A sea shore plant occurring in America, India, Malayan peninsula and islands. Australia and Africa.

Abutilon auritum, Sweet Hort, Brit. 1 p. 58.

A tall shrubby plant 7 or 8 feet high, much branched pubescent leaves ovate cordate obtuse 4 inches long three inches wide edge crenulate light green pubescent, petiole 3-4 inches long. Stipules ovate ¼ inch long. Panicles terminal lax with branches 4 or 5 inches or more long pubescent. Pedicels ½ inch long. Sepals ovate subacute ⅜ inch long green woolly pubescent. Corolla an inch across, petals obovate minutely mucronate bright orange yellow finely striate. Staminal tube much shorter with 6 filaments. Fruit ½ inch long of 9 carpels.

Common all round Flying Fish Cove to Smith point, and to North East point along the Cemetery road. On the lower terrace. Flowers opening in the afternoon.

Collected also by myself in 1890 and by Andrews. This plant is figured (Bot. Mag. t. 2495) with pink buds and stamens, and the *Sidaatropurpurea* Bl. Bijdr. is said to be the same species. There is no pink or purple about the Christmas Island plant and I do not see why Blume gave his name to the plant. He does not describe the colour.

A. auritum Sweet, is recorded from Java, Timor, Philippines and Queensland New Caledonia.

A. Listeri Baker, fil. Journ. Bot. 1093 p. 269.

A shrubby plant about 6 feet tall, much branched, branches slender scabrid not pubescent. Leaves ovate cordate acuminate minutely stellate hairy on both surfaces but chiefly on the back 4 inches long 2¼ inch wide. petiole slender 2 inches long. Panicles few flowered or flowers solitary axillary on slender pedicels 1½ inch long, Calyx ¼ inch long lobes ovate acuminate closely pubescent. Petals oblong obtuse ¾ inch long orange yellow, stamens yellow, free portion of filaments as long as the tubular portion. Carpels densely covered with irritating hairs.

Common all round Flying Fish Cove, Rocky point, Cemetery road, and lower part of Phosphate hill, and at the Waterfall. Endemic. First collected by Mr. Lister.

The *Abutilons* are among the showiest plants in the island. They open their flowers in the afternoon.

Hibiscus vitifolius, Linn.

A tall slender plant about 6 or 8 feet tall, branched, stems velvety pubescent. Leaves ovate cordate or hustate acuminate or shortly three lobed irregularly crenulate and very variable in size 1⅜-4 inches long 1-2 inches wide light green velvety pubescent. Panicles small terminal. Flowers shortly pedicelled, Calyx tube globular lobes triangular lanciolate grey pubescent ¼ inch long, Corolla ½ inch long prim rose yellow with a purple centre. Rare, North East Point on the shore terrace. Collected there also by Andrews.

Rather a small flowered form with the leaves less lobed than usual. This plant seems to be common in Ceylon and India, and occurs in Moa, Java, Timor and Australia but is absent from the Malay peninsula. It is apparently a weed of cultivation in waste ground in Ceylon, but it grows far away from any cultivation in Christmas Island.

H. Vrieseanus, Hassk Pl. Jav. Rar 1048 p. 304.

Stems about 12 feet tall ¾ inch through pale green brittle with a large pith inside, densely covered with transparent pungent bristles. Lower leaves cordate suborbicular with 6 acuminate points, edge between waved and serrate, nerves 6 to 8 upper leaves more distinctly lobed 6 inches long seven across, quite glabrous on both surfaces except for some scattered, bristles on the upper nerves, petiole 8 inches long thickly around with pungent bristles. Raceme a foot or nine long bristly. Involucral bracts 1 inch long acuminate lanceolate setose sparingly except the edge which is densely setose. Bracts broadly triangular acuminate 1½ inch long. Calyx spathaceous. Corolla 6 inches across, lobes rounded expanded, pale lemon yellow with a maroon eye. Pistil conic densely setose. Capsule conic on a 2 inches peduncle, over 2 inches long 5 angled densely spiny setose. Seeds sub-globose pubescent.

In the centre of the island on the track to Murray hill in thick scrub. Also obtained by Andrews, in a valley on the West Coast.

This beautiful Mallow, is I think certainly what Hasskarl intended by his *H. Vriesianus*, a very little known and apparently rare plant. It differs from his description slightly, the leaves can hardly be said to be lobed, and are nearly glabrous and the fruit cannot be described as small. *H. Vriesianus*, was obtained originally in Java, and does not seem to occur elsewhere. The plant is undoubtedly indigenous to Christmas Island. It occurs in the dense woods of the interior. It is very difficult to see how it has got there.

H. Abelmoschus, L. The musk seed was found by myself at my first visit near the settlement. It is common cultivated plant, and no doubt had been introduced. It has since disappeared.

H. tiliaceus, L.

This sea shore tree is abundant in Flying Fish Cove and at North East point and also at the Waterfall, growing as usual close to the sea. It is common on all the sea coasts from Polynesia, to Sandwich Islands, Galapagos, Malay islands, Cocos, Pitcairn Island, to the Malay peninsula. First collected in Christmas Island by Lister, also by Andrews. The seeds are sea borne, and the flowers fertilized by *Megachile* sp.

STERCULIACEÆ.

Kleinhovia Hospita, L.

A large shrub or tree about 20 feet tall with panicles of rose pink flowers very showy. Fruit capsular, with small seeds. Common on the lower terraces Rocky point, Phosphate hill, etc. First collected by Andrews. The plant is quite typical. The distribution is Philippines, New Guinea, Java, Banka, Malay peninsula, India and Ceylon and East Tropical Africa. In the Malay peninsula where it is not common, it occurs on river banks. I suspect this plant is dispersed by sea but am doubtful as to how it comes to be widely spread. It does not seem to be a typical sea shore plant.

Triumfetta suffruticosa, Bl.

A large branched shrub, stems hairy with pale appressed hairs. Leaves alternate ovate orbicular cordate acute crenulate, sprinkled with stellate hairs on both sides (young leaves densely pilose) 3 inches long and as wide, petiole sub-glabrous $\frac{3}{4}$ to 3 inches long. (Flowers yellow). Fruit spike 3 to 4 inches long densely crowded. Capsule 4 or 5 celled, about 1 inch across including the bristles, on a pedicel $\frac{1}{2}$ inch long, cells densely covered with hooked bristles covered with white hairs, cells one seeded seed $\frac{1}{8}$ inch long ovoid pustular-dotted.

Shore terrace North East point and on Steep Rock. Not previously collected.

I believe this identification is correct, as Blume's description fits the plant, but it was out of flower at the time I collected it. I do not understand however how Dr. Stapf (Flora of Kinabalu) says it is closely allied to the weedy narrow leaved *T. pilosa* Roth, no two plants of the same genus could be more diverse.

The distribution given for the species is Lousiade Archipelago, Solomon Islands, Timor Laut, Java, Borneo (Mt. Kinabalu). The fruit is entremely adhesive, and clings to clothing like burrs. It is doubtless distributed by adhering to birds feathers.

Melochia arborea, Blanco.

A soft wooded tree about 15 feet tall with a simple stem and a large head of foliage. Flowers in corymbs, small pink with an ochre spot in the centre. Fruit capsular with winged seeds.

One tree seen in Flying Fish Cove, one at the waterfall and one on the South Coast. Not previously collected. Distribution: Philippines, New Guinea, Java, Borneo, Indian, Malay Peninsula and Mauritius (doubtfully wild).

I am doubtful as to how this plant is disseminated.

TILIACEÆ.

Berria ammonilla, Roxb.

A tree with light colored bark; leaves ovate acuminate, base broad truncate or cordate glabrous 3-8 inches long, 1½ to 5 wide, primary nerves 4-5 pairs, petiole slender 1-4 inches long. Panicle 4 inches long, flowers numerous small ¼ inch across white. Pedicels ¼ inch long covered with stellate pubescence. Calyx capsular four lobed, lobes broadly ovate, covered outside with stellate pubescence. Corolla lobes 4 oblong longer obtuse white. Stamens innumerable short, anthers cordate. Capsule 6 to 8 winged, 1½ inch across the wings, wings in pairs to each cell, papery red brown oblong rounded ¾ inch long glabrous ; seeds one in each cell obscurely angled nearly ¼ inch long, fuscous densely covered with stiff red hair.

Common along the shore terraces from Smith point to North East point, much more scanty on the Plateau. This plant was very early observed though it does not appear in Hemsley's list of plants collected by Lister. Its hard wood was mistaken for teak, and from this error apparently arises the statement first made by Hemsley that *Tectona grandis* occurs in the island. So conspicuous a tree as this latter could not have escaped Andrews nor myself, so that it may be considered that there is no evidence that the true Teak, (*Tectona grandis*) occurs or ever did occur in the island. *Berria* I found in flower and fruit in October, and in fruit also on the occasion of my first visit and also received a fruiting specimen from Mr. Keyser collected in August. It is called Bastard-Teak and Bungor (not Boognor as in Andrews' list) which is the ordinary Malay and Javanese name for *Lagerstroemia.* Probably the Javanese considered its wood to resemble that of the *Lagerstroemia.*

Except for the much smaller flowers, little over a quarter of an inch across, I see very little difference between this plant and the typical Ceylon plant, which has flowers ¾ inch across.

The distribution of the Berrias and of this species seems very curious. One or two distinct species occur in Tahiti and *Berria amonilla* is found in the Cumberland islands, East of Queensland—a distinct variety, Christmas Island and Ceylon and is probably native in Southern India.

The fruit is winged as described, but from what I saw of it does not fly any distance from the tree. When ripe it dehisces letting out its seeds which are covered with appressed hairs. It is not usual to find a winged fruit which dehisces before germination of the seed, and though I would class this among wing-fruited plants, I think it most improbable that the fruit with its seed could have been brought to the island by wind, as it dehisces so soon that the seed would probably be dropped out before at reached the island. It is more likely that the seed is dispersed by sea currents.

Grewiv osmoxylon, n. sp.

Tree, about 30 feet tall. Leaves lanceolate acuminate with a broad or rounded base serrate—crenate 4-6 inches long 2-3 inches wide, glabrous, nerves 6-7 pairs petiole hardly ½ inch long sprinkled with a few stellate pairs. Racemes axillary or terminal wider an inch long 4 or 5 flowered, rachis pubescent. Buds globose grey pubescent. Sepals linear oblong 5⅕ inch long white, rather coriaceous, pubescent outside. Petals ¼ length rounded base pubescent. Stamens yellow shorter than the sepals very numerous. Fruiting racemes elongated slightly drupes in pairs, pyriform ⅛ inch long pulp thin testa bony, one celled one seeded. Rocky point and North East point. "Kayu Wangi." Baker. fil. in the Monograph gives the Kayu Wangi as *Grewia laevigata* Vahl, but this is described very differently by Miquel. In his description, the plant is a shrub with not more than three nerves to the leaf, which is pilose in the nerve axils, and the drupes are puberulous with 4 to 2 pyrenes. I cannot think that this description can possibly apply to the Christmas Island scented wood, nor can I find any description to fit this plant. The fruiting specimens sent me by Mr. Leach, are probably not ripe but the seeds are hard and the embryo firm in texture. They are remarkably small for a *Grewia.* The tree was commencing to flower shortly before we left the island and seems abundant along the Cemetery road as far as N. E. point, along the shore terrace.

Gr. insularis, n. sp.

Tree about 20 feet tall, shedding its leaves after fruiting, twigs densely stellate hairy. Leaves ovate subacute with a rounded base, crenulate 3 inches long 2-2¼ inch wide sprinkled all over but especially on the nerves with stellate hairs, petiole densely stellate pubescent, ¼ inch long. Racemes axillary ½ inch long in pairs or three densely stellate pubescent. Flowers in umbels of 3 on each raceme, pedicels ¼ inch long. Buds oblong pubescent. Sepals linear oblong woolly pubescent ¼ inch long yellow. Petals oblong ⅓ of the length of the sepals pubescent at the base. Stamens ¾ the length of the sepals. Fruit not seen. North East point, fairly common. I cannot identify this with any other described species.

RUTACEÆ.

Acronychia Andrewsi, Baker. fil. Monogr. Christmas Island P. 174.

A small tree attaining a height of about 20 feet and sometimes more, bark pale. Leaves bright green trifoliate flowers in short axillary panicles. Fruit a small pale pink berry.

Common, Smith point, Cemetery road. Endemic. The fruit doubtless eaten by birds.

MELIACEÆ.

Melia azederach, L.

This tree is evidently introduced; the biggest specimens occurring at the police quarters close to *Cassia* *siamea* and *Eriodendron*, but it has spread abundantly all over Flying-Fish Cove and up Phosphate hill and round the coolie lines there. It forms with *Trema Boehmeria* etc., a great portion of the secondary jungle which springs up after fallowing. The drupes are certainly eaten by birds and the seeds so disseminated. It is absent from all parts of the forest which have not been cleared, and is certainly not native.

Dysoxylum amooroides, Miq. Ann. Mus. Bot. v. 4, p. 16.

A very big tree, 60 to 90 feet or more, tall leaves 18 inches long, leaflets glabrous membranaceous, 6 pairs, the lowest smallest, oblong lanceolate acuminate inaeguilateral, alternate 6 inches long by 2 inches wide "Panicle extra-axillary, the branches spike-like or branched with few branches. Flowers sessile. Calyx 5 sepalled villous outside. Petals yellowish pubescent outside" Capsule 1-1¼ inch long pyriform or sub-globose coriaceous wrinkled orange, 4-split, seeds ½ inch long ovoid angled indian red with thin testa.

Common in the forests of the plateau and descending to Flying Fish Cove. The tree was fruiting at the time of our visit and the ground in some places was strewed with the seeds. Obtained first by Lister, but too incomplete for identification by Hemsley, who describes the tree as 13 feet through. I never saw any nearly as big as this.

Distribution, New Guinea and Java.

The seeds are certainly eaten by birds ;

BURSERACEÆ.

Tristiriopsis Nativitatis, Hemsley.

Tree 40 to 60 feet tall with grey bark. Leaves bipinnate, in young plants much branched about 2 feet long, adults 6 inches long, leaflets alternate 6 pairs or fewer oblong lanceolate petioled, young serrate, adult entire coriaceous, 2 to 4 inches long $\frac{3}{4}$ to $1\frac{1}{2}$ inches wide, nerves about 9 pairs, petiole $\frac{1}{4}$ inch long. All glabrous except for tufts of hair in the axils of the nerves on the back. Inflorescence in leaf opposed panicles. Flowers not seen. Peduncles in fruit $\frac{1}{2}$ inch long. Calyx persistent 5 lobed to the base lobes $\frac{1}{8}$ inch ovate obtuse pubescent. Drupe 1 inch long green ovoid beaked, base stalked, 3 celled, pericarp thinly pulpy, cell walls woody, hairy within.

Flying Fish Cove, Phosphate Hill, Plateau No. 67.

This was mentioned by Hemsley in Journ. Linn. Soc. XXV. (1890) p. 353, as "*Burseracea?*" Flowers have not yet been obtained and though it is common in Christmas Island, Andrews does not appear to have collected it. Identified by Mr. Hemsley.

CELASTRINEÆ.

Celastrus paniculatus, Willd.

A small tree, Rocky point (Andrews). I saw what I suppose to be this plant in the same locality but it was flowerless and also without fruit.

Distribution Indo-Malaya.

RHAMNACEÆ.

Colubrina pedunculata, Bakes fil. Monog. Christmas Island 195.

A straggling tree, with ovate leaves and flowers in axillary cymes, on long peduncles. Fruit subglobose capsular dehiscing irregularly $\frac{1}{4}$ to $\frac{1}{3}$ inch long; seeds hemispheric with a rounded back and broad inner faces, bright brown polished and very smooth.

North coast, (Andrews) abundant on the apper cliff above Flying Fish Cove, and at Andrews Lookout on Phosphate hill. In dry places. It was in fruit at the time of our visit, Andrews found it in flower in February, Endemic. • This is a plant of very different habit from *Colubrina asiatica* the common Malayan species, being a much bigger and more tree-like plant, with very different leaves as well as its much longer inflorescence. It appears to shed its leaves almost completely after fruiting. *C. asiatica* is a sea shore and open sandy country plant.

AMPELIDEÆ.

Cissus repens Lam.

A common vine over the bushes in Flying Fish Cove Rocky point.

Collected first by Andrews on Phosphate Hill.

Distribution India, Andaman Islands, Malay Peninsula, Java.

Cissus pedata var *glabrescens.*

Stems glabrous more or less flexuous obscurely 4 angled, internodes 3-4 inches long. Tendrils branched opposite the inflorescence. Leaves when young more or less pubescent adult glabrous, petiole 2 inches long pubescent when young, glabrous in old leaves, limb 5 to 7 foliolate lobes unequal, central one ovate with a broad base, on a petiolule 1½ inch long, thin crenulate dentate 4 inches long 3 inches wide, nerves 8 pairs, sparingly pubescent, lateral lobes oblique inaequilateral narrower, and more distinctly crenate. Cymes small, opposite to the leaves 1½ inch or little more long, peduncle 1 inch long (lengthening in fruit). Flowers green glabrous very small. Calyx shortly 4 lobed. Corolla ovoid in bud, 4 petals 4 valvate narrowed upwards from a broad base. Fruit ¼ inch through pink, seeds 4¼ inch long angled in front, smooth rounded polished on the back.

Smith Point etc., common.

This is no doubt the plant collected by Andrews and so identified in the monograph of Christmas Island, but it differs from the description by Planchon in the Mon. Phau. p. 558. in the form of its leaves, and its much more glabrous habit. I have a somewhat similar form from New Guinea.

Cissus pedata Lam. is distributed over India, Siam and Java but appears to be quite absent from the Malay Peninsula. Fruit as large as a pea, pink; flowers green fertilized by *Polistes Balder* Kirb.

Leea sambucina var *intermedia.*

A tree or large shrub 20 feet or more tall, young stems smooth glabrous green fluted, internodes one foot long, sprinkled over with scattered thorns, adult stems thornless covered with a red, scaly bark. Leaves 12 inches or more long, leaflets oblong lanceolate acute crenulate 3 inches long 1½ inch wide, glabrous except for a tuft of reddish hair in the axils of the nerves on the back. Cymes 3 inches long with tufts of hair in the axils, and the ultimate branches pubescent. Bracts lanceolate acute or subacute. Flowers green, calyx cupshaped with 5 short teeth, pubescent. Petals 5 lanceolate subacute hooded at the tip glabrous staminal tube very short and toothed. Fruit globose grey green ¼ inch through when dry, 4 seeded.

This plant is common all over the island, but especially on Phosphate hill, Flying Fish Cove, etc. It is rarer or absent on the Plateau.

It has been referred to the common Malayan species *L. sambucina* and also to *L. horrida* Teysm. It is however not typically either species, but rather intermediate between the two. In general it resembles *L. sambucina* except for its much greater size, smaller corymbs and leaves with tufts of hair in the nerve axils and the presence of distinct thorns on the young stems. In these points it approaches *L. horrida,* which however is much more thorny the thorns being persistent and occurring on the branches, and which does not possess the axillary hairs of the nerves of the leaf.

Distribution of *Leea sambucina* Willd, India, Andamans, Malay Peninsula.

SAPINDACEAE.

Cardiospermum Halicacabum L. A single plant on the coral beach in Flying Fish Cove. This plant occurs frequently as a weed of cultivation and is often cultivated to a small extent as a pot herb.

Allophyllus Cobbe var *glaber*.

A common small tree, Rocky point. Plateau, Flying Fish Cove, N. E. Point, Steep Point.

This plant was collected first by Andrews. The species as generally described includes a number of forms very different in appearance from low shrubs with small glabrous leaves to small trees with large leaves. The Christmas Island plant is not the common sea shore bush, but a bigger erect little tree, which is usually met with in forests.

ANACARDIACEAE

Spondias dulcis, Forst.

A gigantic tree 100 feet tall and 2 feet through with light grey crackled bark. Leaves pinnate. Flowers in short panicles, small white. Drupe elliptic oblong brownish black crackled 2 inches long, pulp yellow acid.

Woods at Andrew's Look out, local but a fair number of trees together. Leafless when we first arrived later with young reddish leaves and fruit, and just commencing to flower.

The first record of this tree here.

LEGUMINOSAE.

Erythrina indica, Lam.

A smooth barked tree usually of a moderate size, but Andrews met with one 18 feet in circumference.

Distribution Sunderbuns, Andamans, Malay Archipelago, Polynesia. Seeds of apparently this species sea-drifted to Cocos Island.

Canavalia ensiformis, De. C.

Shore. (Andrews).

This plant, the Kachang Parang of the Malays is only known in cultivation and is a well-known native vegetable. It was probably an escape from cultivation when Andrews collected it. I did not observe it.

C. obtusifolia var *insularis.*

A strong but slender climber covering bushes with a dense mat of foliage. Leaves trifoliate, leaflets ovate obtuse, bases nearly equilateral broad rounded 4-5 inches long, 3½ inches wide, petiole 3 inches long, petiolules of lateral leaflets ¼, of terminal 1 inch long. Raceme 4 or 5 inches long. Flowers opening singly. Calyx ½ inch long urnshaped bilobed, upper lobe larger emarginate. Petals dark red rose, standard 1¾ inch long ¾ inch wide, oblong obovate retuse, claw and centre at base greenish white. Wings 1¼ inch long ¼ inch wide oblong obtuse, keel petals broader elliptic oblong. Stamens 10 fertile, anthers rounded ovate dull yellow, style shorter. Pod oblong beaked 4 inches long 1¾ inch wide, the rib close to the upper suture, seeds 2-4 subglobose, slightly flattened, dark brown.

This abundant bean climbing over bushes on the Cemetery road and Phosphate hill differs much in appearance from *C. obtusifolia*, in the more oblong standard, and in Christmas Island in its red not rose colored petals. In plants cultivated in Singapore the petals were more rose colored.

Strongylodon ruber, Vogel.

A climber with slender stems leaves trifoliolate. Flowers red. Pod oblong turgid with large round seeds, Common in Flying Fish Cove. and Phosphate hill ; collected also by Andrews. This was not in flower at the time of our visit but in fruit. Distribution, Ceylon, Andamans, Australia and Polynesia. The seed probably sea borne. Seeds sea drifted to Cocos Island.

Galactia tenuiflora, W. & A.

A slender climber with trifoliate leaves 1½-2 inches long. Flowers pink on the inner face, green on the back about ¼ inch across. Pod sword shaped : 1-2 inches long, narrow.

This pretty little vetch, climbs over the bushes abundantly at Rocky point and on Phosphate hill.

Distribution Africa East and South, India, Siam, Malay Islands, Australia.

Pongamia glabra, Vent.

A tall straight tree in the forest or low bushy straggling one on rocks, with rather thin 5-7 foliate leaves and racemes of pink flowers. Pods one seeded flattened, indehiscent.

Common beyond Rocky point, Flying Fish Cove, North East Point.

Distribution Mascarene Islands, India, Malay Peninsusula, and islands, North Australia and Polynesia. A typical sea shore and tidal river bank plant as far as the typical form is concerned some of the trees in the woodlands were remarkably straight and tall and very different in appearance from the common Malay Peninsula plant.

Inocorpus edulis, Forst.

A big tree with a remarkably grooved stem, and light colored bark ; leaves oblong very dark green coriaceous. Flowers in short axillary racemes yellow. Fruit flattened orbicular, one seeded. Common, Flying Fish Cove. Distribution Polynesia.

The wood is poor, light colored fawn, the centre darker, rays very fine numerous with many fine transverse bars; pores in short lines, joined together and separated by transverse partitions. Weight 41lbs per cubic foot.

The red crabs, *Gecarcinus*, seem very fond of the fruit of this tree of which they eat the green husk. As they drag them from some distance to their burrows for this purpose, it is not uncommon to see a dozen or so young plants growing in a circle round the mouth of the burrow. The seed when boiled is eatable, and very good tasting like a chestnut. It is undoubtedly a sea dispersed plant the strong husk protecting the seed from injury, while floating in the sea.

Specimens were first obtained by Lister and from these Professor Oliver (Icones Plantarum t. 1837) gave a figure and description of the seed, to correct the misconception of its structure by Gaertner, but as a matter of fact Lister's fruit was very young and Gaertner's that of a fully ripe fruit. The tree has long been cultivated in the Botanic Gardens at Singapore, where it regularly flowers and fruits. The fruits, only 2 or three ripening on one raceme, are flattened pearshaped polished green or yellowish green; when quite ripe 5 inches long, 4 wide and about an inch through. The remains of the style, represented by a very short elevation is more than half way along the upper edge from the stalk. There are often a few small points also in the sides. The stalk is short under $\frac{1}{2}$ inch and stout. The pod which is indehiscent is one seeded. The exocarp is composed of the thin green epicarp, followed by a fibrous almost woody portion $\frac{1}{4}$ to $\frac{3}{8}$ inch thick. Beneath this is a pithy white mass, at first very thick but disappearing as the seed developes, so that when the seed is ripe there is little or none left. The ripe seed is 3 inches long thick orbicular heart shaped, yellow wrinkled, with no albumen.

The fruits of the Christmas Island trees were on the whole smaller than those of the Gardens plants, but I saw few ripe ones and many fallen ones were sterile. The pod with its fibrous coat is well suited for sea dispersal, and is undoubtedly so dispersed. Its later dissemination over the island is effected in part at least by crabs and perhaps also by the fruit bats. For these animals the eatable part is the green outer coat of the pod. In Singapore the seeds are often destroyed before they are ripe by the squirrels which gnaw through the pod to eat the seed.

Caesalpinia (*Guilandina*) *borducella*, Fleming.

A strong thorny climber with pubescent leaflets, and racemes of yellow flowers, with recurved pubescent bracts. Capsule 3 inches long brown spiny containing 1 or 2 round grey seeds.

Common at Smith point, and North East Point collected also by Andrews. In bud at the close of our visit

Distrib. All tropical countries. A typical sea shore plant, the hard seeds of which are sea borne.

Entada scandens, Benth.

East coast (Andrews) I did not meet with this big climber anywhere.

Distrib. India Malay Peninsula, Africa South America seeds are often found in sea drift and it is one of the best known sea-dispersed plants. Mr. Chapman found a seed in the sea at Christmas Island.

COMBRETACEAE.

Terminalia Catappa, L.

This tree is very abundant over much of the island not only along the lower terraces and on the sea beach but also on the Plateau. Many of the trees are very large with big buttresses. The wood is hard and dark red brown. I have not seen trees as large elsewhere.

It is however otherwise identical with Malayan forms. The fruit is sea borne, and also disseminated over the island by crabs which eat off the outer coat. Occasionally I saw large quantities of seeds collected together but by what animal I do not know, possibly by fruit bats, which in Singapore are very fond of the fruit and carry it far away.

Distribution. Most tropical countries but often planted, wild only on sea shores.

The wood is very hard, dark red with a satiny lustre, rays fine pores few and large, a very superior timber to any samples I have seen from the Malay Peninsula.

Combretum acuminatum, Roxb.

A woody climber common on the shore terraces and on the plateau. I saw neither fruit or flowers of it. The fruit is described as four angled and oblong, like that of *Combretum trifoliatum* which I have found floating in the sea off Singapore.

Distribution India and Malay islands.

Quisqualis indica, L. A woody and thorny climber, with bunches of red flowers. Flying Fish Cove on rocks above the bay towards the Magistrate's House, also on North East Point, collected also by Andrews. Undoubtedly wild.

The fruits are probably sea borne, they are somewhat lanceolate in shape acuminate and angled. Distrib. Burmah, Malay Peninsula, on the East Coast.

Gyrocarpus americanus, Jacq.

A very large thick stemmed tree with grey rather smooth bark, and soft white wood with very distant rings. Leaves clustered on the ends of the branches rounded ovate acuminate long petioled. Flowers unisexual in large cymes, apetalous, calyx 4-7 partite, stamens 4-7 in male flower, calyx 2 partite in female. Nut bony with two long spathulate wings 3 inches long. Common and very conspicuous along the lower terraces by the sea. Flying Fish Cove, N. E. Point, Waterfall. The tree sheds its leaves after flowering at at the time of our visit only a few bare bunches of hanging green fruits at the ends of the boughs. Many trees were leafless but a few were begining to produce leaves again. The settlers call it cabbage tree on account of its soft pithy wood. like that of a cabbage stalk. It is perfectly useless, of a light fawn color with large rings and wavy fibres with few large pores. Distribution. All tropical countries

MYRTACEAE.

Eugenia gigantea, n. sp.

A gigantic tree over 100 feet tall with immense buttresses. Bark light coloured with large thin flakes. Leaves opposite elliptic oblong or lanceolate or ovate subacute lower ones large 6 inches long by 4 inches wide, upper ones 3 inches by 1¾ wide, glabrous subcoriaceous narrowed at the base to the petiole which is ½ an inch long, primary nerves 11-12 pairs, prominent beneath. Cymes below the leaves 3 inches long, branches slender divaricate. Flowers in trees at the ends of the branchlets, white sessile ¼ inch long, ovary turbinate strongly wrinkled when dry. Calyx cupshaped entire. Petals forming a round shield shaped cap coriaceous. Stamens very numerous short white. Style longer rather stout. Drupe half an inch long subglobose purple.

The biggest tree on the island and the biggest species of *Eugenia* I have ever seen. It is abundant all over the plateau, occasionally descending a little lower as at Flying Fish Cove. Specimens of this tree have been collected by all botanists who have visited the island but no account of it has been published.

Barringtonia rubra Miq. lc. p. 487 *Butonica terrestris* Rumph. Amb. iii. lib. 5, p. 181, t. 115, *Barringtonia racemosa*, Bl. (non Juss.) Van Houttes Flora vii. p.

23, Miq. Fl. Ned. Ind. 1, p. 486. Baker Flor Christmas Island.

A tree about 30 feet or more tall rather slender and straight. Leaves crowded at the tips of the branches obovate or oblanceolate acuminate narrowed to the winged petiole, 10 inches long by 4 inches wide, edges crenate serrate, nerves about 16 pairs, petiole winged nearly to the base corky ½ inch long. Racemes pendulous 1½-2 feet long, rachis slender. Flowers rather distant on slender pedicels ½ inch long. Calyx lobes 4 pale green ovate oblong ½ inch long. Petals twice as long oblong. Stamens 1 inch long white or rose pink. Fruit 2 inches long ¾ inch through green oblanceolate in outline narrowed to the base and shortly beaked, very obscurely four angled.

Common in the woods on the upper terraces, and plateau, and occasionally lower.

Distribution Banka, Patjetan, South Java and Amboina.

This plant has been erroneously referred to *B. racemosa* but as Miers (Trans. Linn. Soc. Sec. II. vol. i. p. 69 has very properly shown, *B. racemosa* of many authors is a mixture of several distinct species, and the original species is Indian only. From *B. inclyta* Miers the common plant of the Malay Peninsula, this species differs in its much thinner and smaller leaves, and much smaller flowers and fruits. *B. inclyta* is a typical sea shore plant and grows in damp muddy spots near the sea. It is included under *B. racemosa* in the Flora of British India and the Materials of the Flora of the Malay Peninsula. *B. rubra* is a woodland plant Rumaphius describes it as growing in sulphureous and gravelly soil and it grows in Christmas Island among the detritus of coral reefs. The flowers are either white or rose pink. I was unable to find any other distinction between the two forms, I observed that the fruits were untouched though abundant by any animal, even the crabs which eat the outer coat of the fruits of *Inocarpus* greedily do not appear to relish that of the *Barringtonia*. The plant has doubtless arrived at the island by sea, as seeds of *Barringtonias* are among the commonest sea drift ones.

TURNERACEÆ.

Turnera ulmifolia, L.

This native of South America has established itself on the sea-beach in Flying Fish Cove. It is a shrubby herb with lanceolate toothed leaves and large yellow flowers.

Probably introduced into cultivation in the East as an ornamental plant it is now well established in sandy places beyond Tanjong Katong in Singapore. It never seems to thrive inland.

ONAGRACEÆ.

Ludwigia prostrata, Roxb.

A common yellow flowered herb abundant in wet spots in many parts of the world. It is rarely prostrate as its name implies but usually erect.

Flying Fish Cove a few plants behind the house, among the bananas. This plant appears to be disseminated by its seeds adhering to the feet or feathers of aquatic birds, and also is spread by streams and rivulets. In this case however I should suggest from its habitat that the seeds have been accidentally brought in rice, and got dropped outside the house.

LYTHRACEÆ.

Pemphis acidula, Forst.

A shrub with a rough barked stem often of considerable thickness, narrow obovate elliptic lanceolate dark green leaves, usually rather stiff, small white flowers and a small acid berry.

Common on the sea rocks from South point to Rocky point.

Var *crassifolia*. Leaves very thick and succulent. Between Waterfall and Steep Rock. This form is very strikingly different from the common one when alive on account of the very thick leaves but I could see no other difference. It formed very large erect or sub-erect bushes or almost trees along the shore in one place, and where exposed to the heavy sea spray and winds it formed a prostrate dense mat of wiry branches lying over the rocks.

Distrib. Africa and Mascarene isles, Cochin China, Hong Kong, Burmah, Ceylon, S. India, Andamans, Malay Peninsula and islands Australia Polynesia.

FICOIDEÆ.

Sesuvium portulacastrum, L.

A succulent creeping herb with fleshy linear terete leaves, and pink star-like flowers. Fruit a capsule with many seeds.

Densely covering rocks on the top of a promontory by the little White Cove between the Waterfall and Steep Rock.

The seeds and probably portions of the plant are dispersed by sea. It is a common seashore-plant in all parts of the Tropics, growing in tidal mud or on sea-rocks. The whole plant when boiled makes an excellent vegetable, and is known to the Javanese as Sesepit. The boobies near the waterfall used branches of it to make their nests.

Distrib. Tropics generally.

CUCURBITACEÆ.

Zehneria alba, n. sp.

Stems slender glabrous. Leaves ovate cordate acute entire dark green glabrous, upper surface dotted over with glands? 3-4 inches long 4-5 across, petiole 1-2 inches long slender, nerves 7 pairs radiating from the base Tendrils long and slender. Male flowers numerous in umbels on peduncles ½-1 inch long slender glabrous, pedicels slender ¼ inch. Calyx cupshaped glabrous obscurely toothed. Corolla small ⅙ inch long white glabrous lobes lanceolate subacute. Stamens 3, filaments glabrous, anthers elliptic thick, connective not prolonged.

Female flowers 4 or 5 in an umbel, white, ovary narrowed to a beak. Fruit elliptic pink ½ inch long Seeds rounded flat smooth margined.

Extremely abundant, Flying Fish Cove Waterfall. Phosphate hill, Plateau, etc.

This is the *Melothria mucronata* of the flora of Christmas Island doubtless, which is identified with *Zehneria Baueriana*, Eudl. but it does not appear to me that it can be even a form of this plant.

Melothria, sp. Trailing on rocks east coast (Andrews). There may be another of these small Cucurbitaceæ here, as I found a plant with a single yellow flower on the waterfall track, but could get no more.

Momordica charantia, L. This common cultivated plant has run wild about cleared spots. It is of course not native but is the common small fruited form to which the cultivated form quickly reverts.

ARALIACEÆ.

Heptapleurum natale, n. sp.

A long climber with grey stems. Leaves 5 foliate, petiole 3 inches long, leaflets elliptic obtuse or subacute rather fleshy light green, the two outer ones smaller and suborbicular 2 inches long 1½ wide, central ones 4 by 2½, petiolules slender ½ to 1 inch long. Cymes 3 or 4 inches long branched from the base, lower branches 2 inches long, flowers copious green 10-13 inches in an umbel, pedicels $\frac{1}{4}$ inch long slender. Buds oblong obtuse, ovary short turbinate. Petals oblong linear, obtuse 5, stamens 5 alternate.

Fruit not seen.

Very abundant on rocks and trees, all over the island, flowering in the end of October.

This plant is certainly not I think the common *H. ellipticum* Seem. A native of the Malay Peninsula.

RUBIACEÆ.

Randia densiflora var *laxior*, Bak. fil.

A large straggling shrub, stems under an inch through, 10 to 12 feet or more tall. Leaves dark green subcoriaceous lanceolate acuminate acute glabrous 4-5 inches long 2 inches wide nerves 8 pairs, petiole $\frac{1}{4}$ inch long. Panicles axillary 3 inches long and often as wide, peduncle $\frac{1}{2}$ inch long. Bracts small lanceolate acute $\frac{1}{16}$ inch long. Pedicels very short calyx $\frac{1}{8}$ inch long dilated upwards from a narrow base with very short ovate teeth. Corolla tube $\frac{1}{3}$ longer thick, lobes linear lanceolate $\frac{1}{4}$ inch long, white turning yellow, hairs in the mouth of the tube few and short. Anthers linear mucronate.

Berry elliptic red $\frac{1}{4}$ inch long crowned with the persistent calyx lobes.

Extremely abundant all over the island especially on the lower terraces, but also on the plateau up to 900 feet all and perhaps the most abundant plant on the island, commonly known as wild coffee from its white sweet scented flowers. The stems form excellent walking sticks.

Collected first by Lister and by all subsequent visitors.

This plant is very different from the common forms of *R. densiflora* in many points, but perhaps hardly sufficiently so to be distinguished specifically. The typical plant is a tree 50 to 60 feet tall, with thicker leaves and fewer nerves, a denser corymb of slightly smaller flowers with a pubescent calyx, and shorter corolla tube. Shrubby forms do occur in the Malay Peninsula also and forms with a quite glabrous calyx. Distribution Malay Peninsula and Islands, Hongkong and North Australia.

Guettarda speciosa, L.

A big tree with large sweet scented white flowers, and a green drupe.

Common on the sea coast, Smith Point, Cemetery road, Waterfall, and in the plateau on the Murray hill track, but most frequent near the sea, rarely inland.

The flowers seemed to me to be larger than usual. The fruit is commonly seen in sea drift, and I found several in the sea, but all had sunk.

Distribution Tropics generally.

Morinda citrifolia, Linn.

A large shrub with dark green leaves, and white flowers. Fruit a syncarp about an inch long. Baker fil. (Monograph of Christmas Island), says that the Christmas Island form seems somewhat different from the usual form in its narrower leaves and, occasionally, tetramerous flowers. It is however quite the ordinary plant of the Malay islands, the form with well developed whitish bracts and is identical with the common sea coast plant of Singapore.

It is common in Flying Fish Cove and at the Waterfall.

The fruits are sea dispersed and the plant is most commonly met with on rocky places above the sea. The white flowers are visited and fertilized by the wasps. *Odynerus polyphemus Polistes balder* Kirb and by the hawk moths *Cepheonodes hylas* and *Macroglossa*, and the bee *Megachile rotundipennis* Kirb.

Distribution India, Malay Peninsula and Islands, Australia and Polynesia.

Saprosma nativitatis, Bak. fil.

A shrub 3-5 feet tall with dark green oblanceolate leaves obtuse 1½ inches long ½ inch wide and small axillary pinkish white flowers, sessile, tubular with 4 lobes. This shrub very common in the Plateau has been well described by Baker. It is quite unlike any other species of *Saprosma* known to me, and does not possess the horrible odour when broken that the other species of the genus emit. It is endemic, and wa first collected by myself in 1890, and is the *Psychotria* sp. of my list.

GOODENOVIEÆ.

Scaevola Koenigii, Vahl. A shrub with obovate fleshy leaves and white flowers, fruit baccate white.

On cliffs above the sea. Common. Smith Point, Flying Fish Cove.

First collected by Lister.

Seeds dispersed by sea. Common on sea coasts of India, Malay Peninsula and Archipelago, Australia and Polynesia.

MYRSINEÆ.

Ardisia polchra, n. sp.

A tall little-branched shrub with a stem about an inch through, leaves elliptic lanceolate glabrous acute narrowed at the base to the petiole, petiole decurrent as two distinct ridges along the zigzag branches which are red scurfy, lamina of leaf 6 inches long 2 inches wide, petiole and midrib red scurfy above dark green paler beneath with scanty red scales; nerves about 24 pairs. Panicle terminal on the ends of branches 4 to 6 inches long, branches slender widely spreading scurfy, ultimate branches an inch long terminating in umbels of 6 to 12 flowers on slender pedicles ¼ inch long, lengthening to $\frac{1}{2}$ in fruit. Bracts very small ovate scurfy pubescent. Calyx lobes very short ovate pubescent. Corolla rose pink $\frac{1}{6}$ inch across lobes rounded ovate mucronulate. Stamens glabrous with short filaments not spiculate. Style twice as long fruit globose white turning to black $\frac{1}{6}$ inch through finely longitudinally ribbed when dry. *Ardisia complanata*, Hemsl. and Bak. fil. In Monograph of Christmas Island etc. Not of Roxburgh.

Common on the Plateau.

I cannot see how this beautiful and very distinct plant can have been mistaken for *A. complanata.* The winged stems are striking even in the living plant, and more conspicuous in a dried specimen.

COMPOSITÆ.

Ageratum conyzoides, Cass.

The common white-weed, with its pale blue or white flowers is common in cultivated ground at Flying Fish Cove

First collected by Andrews. It is common now in all tropical countries as a weed of cultivation, and is partly disseminated by the wind but also by its fruit adhering to cloths etc.

Blumea spectabilis, Dec. A tall weedy plant about 6 or 7 feet tall, with yellow flowers.

Common on the plateau in more open spaces in the woods, along paths and wherever the trees have fallen. First collected by Lister and certainly indigenous. Seed plumed and so wind dispersed.

Distribution India, Ceylon, Malay Peninsula.

This is a hill forest plant in the Malay Peninsula and does not grow at all in the low country.

Wedelia biflora, Dec. A half scandent rough herb with yellow flowers.

Common at the Waterfall and beyond to Steep rock always close to the sea, and forming tangled masses very hard to penetrate. The plant seems to be absent from the North Coast. Its fruit is a truncate achene with no pappus and is doubtless seaborne.

Distribution India, Malaya.

Spilanthes acmella, L.

A common weed of cultivation with heads of yellow flowers, Flying Fish Cove. Collected by me in 1890, not seen before or since. It is one of the common fugacious herbs which appears and disappears in cultivated ground.

Synedrella nodiflora, Gaertn.

A common South American weed with small heads of yellow flowers.

Extremely abundant in cleared ground in Flying Fish Cove, and at the Phosphate hill quarries. First collected by Andrews. Abundant in Singapore and Java, from one of which localities it was probably brought accidentally.

SAPOTACEÆ.

Sideroxylon sundaicum, Burck.

A gigantic tree upwards of 100 feet tall with large buttresses at the base, bark grey, exuding a small quantity of latex when cut. Wood white not very hard. Leaves very variable, lancelolate acuminate acute in young trees and on the lower part of old trees; above elliptic or obovate glabrous dark green when adult; covered with ferruginous tomentum when young, four to six inches long, 2½ to three inches wide, nerves 7 to 10 pairs conspicuous on the under surface when dry, petiole slender ¾ to 1½ inch long. Racemes numerous in the axils of the leaves 1½-2 inches long, red tomentose. Flowers 30 or more on each in distant tufts of 3 or 4 together. Bracts small lanceolate covered with red tomentum. Pedicels rather stout $\frac{3}{16}$ inch long, tomentose flowers green $\frac{1}{8}$ inch across. Sepals 5 ovate obtuse imbricate pubescent. Petals twice as long oblong or ovate oblong pale green glabrous, tube very short. Stamens 5 adnate to the petals and opposite to them, filaments shorter than the petals rather thick and dilated at the base, anthers cordate acute dorsifixed yellow. Staminodes very short acuminate processes alternating with the corolla lobes and adnate below to the tube. Disc thick annular strongly pubescent. Ovary enclosed in disc small conic tapering into a cylindric style shorter than the filaments, glabrous. Stigma minute. Fruit an orange red berry long obovoid, pulpy and sweet, seeds 1 or more, hard dark brown.

This fine tree is common all over the plateau, but generally scarce or absent from the shore terraces. The fruit is much eaten by the pigeons *Carpophaga* who swallow it whole. I have also seen the white-eyes pecking at it and the red crab eating it.

Distribution Pulau Sangian. (I have been unable to locate this island on any map).

The wood is of a smooth creamy white colour with fairly distinct rings, rays very fine and close with numerous fine transverse bars ; pores very small in straight lines parallel with the rays, several conjoined with thin partitions between. Weight 36 lbs the cubic foot. A fine light and pretty wood.

Ochrosia Ackeringae var *angustifolia*, Rendle.

Tree about 40 feet tall, 6 inches or more through. Leaves narrow elliptic lanceolate 3 to 6 inches long $\frac{1}{2}$-1 inch across acute or subacute acuminate at the base dark green closely nerved. Corymbs 1 to 3 inches long on a 1 inch peduncle. Flowers fairly numerous sessile with a small ovate bract at the base. Calyx short $\frac{1}{8}$ inch lobes ovate acute. Corolla tube $\frac{3}{8}$

inch long lobes linear ½ inch long narrow white fragrant. Fruit 1½ inch long fleshy of two yellow cones connate by the base divaricate above.

Common on the lower terraces and also accuring on the plateau.

Distrib Banka.

Seed probably sea-borne as most of the Ochrosias are.

OLEACEÆ.

Jusminum Sambac Ait. The bushy jasmine so commonly cultivated by the Chinese is recorded in the Monograph of Christmas Island as if wild. It is only planted round Ross's old house in Flying Fish Cove and at the Waterfall and has not even spread a dozen yards from where it was evidently planted. It is a large flowered single form. I saw no fruit on it nor indeed have I ever seen any on any plant of it.

APOCYNACEÆ.

Cerbera Odollam Gacrtn, forma.

Was obtained at Rocky point by Andrews. I sought it in vain. Much of this ground has been cleared since for cooly lines, and the hospital, and the woods near by form the handiest place for the coolies firewood supply, so that the tree has probably been exterminated. The Cerberas the fruit of which is well adopted for dispersal by sea require tidal mud usually for their growth, and there is no suitable spot for them in the island, Judging by the note as to the form of the leaves in the Monograph I should suggest that the plant collected by Andrews might be *C. lactaria.*

Distribution India, China, Malay Peninsula and Archipelago, Australia and Polynesia. Seed found in sea-drift at Christmas Island by Mr. Chapman.

ASCLEPIADEÆ.

Hoya Aldrichii, Hemsley.

A lofty climber, stems covered with pale bark. Leaves elliptic or ovate fleshy 4 to 6 inches long light green acute base cuneate, petiole ½ inch long. Peduncle about 6 inches long. Umbel of flowers 2½ inches across, pedicels ½ inch long flowers over ¼ inch across. Petals white or pink. Corona of stamens pink or deep purple pink. Fruit 6 inches long ⅛ inch through common all over the island. Endemic flowering October to January. One of the prettiest plants in the island. The flowers are fragrant in the evening. Seed plumed.

BORAGINEÆ.

Cordia subcordata, Lam. A hard wooded rather low straggling tree, with ovate leaves and tubular orange flowers.

Fruit dispersed by sea. Sea coast on the beach Flying Fish Cove and beyond Rocky point.

Distribution East Coast of Africa, India, Malay Peninsula and Archipelago to Polynesia, a typical coral island tree.

The heart wood is light to dark sepia brown the rings being darker wavy and irregular, rays fine and close, pores scattered scanty. Weight 68 lbs.

Tournefortia argentea, Linn. fil.

A large shrub or tree with rough bark, silvery leaves and cymes of small white flowers.

Common on the sea cliffs all round the island. Smith Point, Flying Fish Cove, Waterfall etc. The flowers are fertilized by *Odynerus polyphemus* Kirb.

I saw one plant growing on a rock with large twisted corky roots as thick as a mans body reaching to the sand, after the manner of Ficus roots.

Distribution Ceylon, Malay islands, Mauritius, Australia.

Ehretia buxifolia, Roxb.

A shrub with long straggling branches, about 6 feet tall. The leaves vary in size according to habit, those of plants growing in shade being much larger than those of the open dry places. They are stiffly coriacious scabrid dark green. Flowers white small.

Common at Rocky point and along the coast to N. E. point, and beyond South point. Always near the sea, and so far as I saw absent from the higher parts of the island though Andrews says it forms the worst of the under-growth there.

Distribution India, Malay-islands, Formosa.

CONVOLVULACEAE.

Ipomea chryseides, Ker.

A slender creeping convolvulus with small bright yellow flowers, and ovate often trilobed leaves.

Phosphate Hill, one plant. Not previously recorded.

This little convolvulus is common in waste ground, sand banks etc., in the Malay Peninsula. It may be classed as a weed of cultivation.

Distribution Tropical Africa, India, China, Malay Region and Australia.

I. pes-caproe, Roth.

The common goat's foot convolvulus with its bilobed leaves and dark pink flowers is common Flying Fish Cove, Isabella Beach and at the Waterfall bay. Most of the plants bore no fruit or flowers, and this was apparently due to the attacks of a caterpillar which ate the buds. A small black hawk-moth caterpillar was found feeding on it at the Waterfall. First collected by myself in 1890.

Distribution all tropics.

I. digitata, L.

Large climbing convolvulus with palmate digitate 5-7 lobed leaves, and large dark pink flowers, seeds woolly.

Flying Fish Cove.

It is difficult to say how this plant is spread about, I have never seen it except in places, which have been more or less under cultivation but I never saw it cultivated anywhere.

Distribution South America, Africa, India, Ceylon, Malay Peninsula and Islands and Australia.

I. campanulata, L.

Abundant by Rocky point along the Cemetery road. A large convolvulus, with ovate cordate leaves and large pale-pink flowers across, with a darker centre.

Not collected by Andrews.

Distribution, India, Ceylon and Malay Islands, possibly wild in the Malay Peninsula.

I. peltata, Choisy.

A very high climber with dark green peltate acuminate strongly nerved leaves 12 inches long and 10 inches across or smaller. The stem of this plant which is milky attains a thickness of four inches. The panicles of flowers are nearly 6 inches long on a peduncle of equal length. The calyx half an inch long and wide, sepals ovate subacute and corolla nearly 3 inches wide with a short tube, of a brilliant yellow.

This fine convolvulus is abundant in the centre of the island on the Murray Hill Park covering trees with a dense mat of stems and leaves collected also by Andrews.

Distribution, Malay Peninsula, Java, Borneo, New Guinea, Amboina, Australia, Polynesia, Mauritius.

Some of these outlying localities may be doubted, as the Australian and Amboinese plants are said to have white, the Mauritius one yellowish white red spotted flowers. If this is so these are probably distinct. All I have seen have bright yellow flowers.

I. grandiflora, Lam.

A climber of no great size with moderately thick stems ovate cordate rather thick leaves, and tubular white flowers, turning yellow soon. The sepals ovate obtuse, corolla tube thick 2½ inches long, limb flat 1 inch across. Capsule large an inch through and seeds shortly villous.

Climbing over rocks and bushes at the wharf, collected also by Andrews "climbing on trees north coast."

Distribution Africa and islands, India Laccadives and Ceylon, Timor, New Caledonia, Australia and Polynesia.

Some authors have confused this with *I. bona-nox*, the well known moon flower which is utterly different. The flowers of *I. grandiflora* are very much smaller and it is not at all a conspicuous plant. It is evidently a sea shore plant and the seeds probably sea-borne.

Convolvulus parviflorus, Vahl.

A small climbing and twining convolvulus with ovate acuminate pubescent leaves 2½ inches long, and umbels over half an inch across of small pink flowers, calyx densely silky hairy, capsule hardly longer splitting into 5 rather thin lanceate acute valves.

Common near Smith point and Rocky point, collected also by Andrews.

Distribution, India and Ceylon, Java and Australia. I have never seen this in the Malay Peninsula.

This is possibly introduced as a weed of cultivation, but it is difficult to say how it gets dispersed.

SOLANACEÆ.

Solanum biflorum, Lour. A herb 2 or 3 feet tall with white flowers and scarlet berries.

Not rare in open spots on the Plateau and on the track to the Waterfall.

First collected by Lister.

Distribution East Ava, Mergui, Malay Peninsula and Malay islands.

S. ferox, L. A shrubby herb very thorny and densely covered with yellow wool. On the road above Flying Fish Cove and Phosphate Hill, (Andrews).

Distribution Indo Malaya.

I did not see this plant, which is a village plant in the Malay Peninsula, more or less cultivated.

S. involucratum, Nees. A plant of similar habit with the broad ovate sinuate toothed leaves thinly covered with stellate hairs. Stem and leaves thorny. Flowers white, calyx in fruit large and thorny concealing the fruit.

Phosphate Hill, and on the track towards Murray Hill. Distribution Java. I have never seen this in the Malay Peninsula. My Javanese plant collector recognized it as a Javanese plant used in local medicine and probably introduced for that purpose.

Physalis minima, L.

A common or weedy plant, from a few inches to a foot high, sub-glabrous, pubescent or viscid leaves ovate entire or toothed or lanceolate. Flowers yellow with a dark centre, axillary ¼ inch long. Berry red globose inclosed in the enlarged ovoid calyx.

Common in Flying Fish Cove and all cultivated ground, and also on the sea rocks.

Three forms were met with, the erect nearly glabrous plant with nearly entire leaves which is common in waste ground; a shorter more prostrate plant with broader pubescent leaves more dentate and rather larger fruit, which occurred on dry hot places near the sea, at the Waterfall; and a more woody prostrate plant densely viscid pubescent with many small round fruits, leaves small and crowded. This grows on very hot rocks above the sea at Smith point.

The plant which is common on waste ground and sandy sea shores in the Tropics of the Old World, is probably disseminated by birds, as also accidentally by man. It was first collected by Lister in Christmas Island.

Datura alba, L.

The white Datura is abundant along the coast line from Smith point to the Cemetery road. Also at the Waterfall. I did not see this except in the neighbourhood of cultivated ground. Andrews records it on all coasts, and as it was found in the island by Lister it must be classed as a native plant. It is a large flowered single white form.

Distribution Tropical Africa, India, Malay islands.

The Daturas probably originating in South America seem to have wandered far over Asia, and I believe from the curious way they have of turning up spontaneously in waste ground the seeds are dispersed by birds in spite of their poisonous nature. I have never seen any really wild in the Malay Peninsula, but *D. fastuosa* is commonly grown in medicinal gardens and is accidentally spread.

ACANTHACEAE.

Asystasia alba, n. sp.

An erect herb about a foot tall and little branched. Leaves opposite in distant pairs 1½ to 1 inch apart blade lanceolate or ovate lanceolate acuminate at the tip, and cuneate at the base, thin light green sprinkled on both surfaces with pale bristles, especially abundant on the midrib, back of the leaf covered with small pustules, nerves 9 pairs ascending conspicuous, 4-inches long $1\frac{1}{2}$ inches wide, petiole setulose $\frac{1}{4}$-$\frac{3}{4}$ inch long. Raceme terminal 1 to $1\frac{1}{2}$ inches long. 6-7 flowered, flowers opening singly, rachis setose. Bracts $\frac{1}{8}$ inch long lanceolate acuminate. Pedicel little longer. Calyx split into five narrow lanceolate acuminate lobes nearly to the base $\frac{1}{4}$ inch long glabrous. Corolla one inch long hardly $\frac{1}{2}$ inch across tube narrow, gradually dilated in the upper part sparingly pubescent pure white. Stamens 4 equal, filaments long slender glabrous, anthers lanceolate minutely cuspidate at the tip, shortly prolonged into two blunt lobes at the lease. Capsule woody narrow $\frac{3}{4}$ inch long dilated upwards 1-2 seeded.

This plant is very abundant on the lower terraces below Phosphate Hill and beyond the Waterfall. I suppose it to be the plant recorded in the Flora of Christmas Island by Mr. Baker as *Asystasia coromandeliana* forma the distribution of which is given as India and Malaya, Africa and Arabia. It would be interesting to know where in Malaya this plant is wild. It is often cultivated in gardens, and occasionally escapes along road sides in villages and towns, but it is certainly not native of the Malay Peninsula nor has it even established itself as a denizen. The only species of *Asystasia* which is indigenous to the Malay region which I have ever seen or heard of is *A. intrusa* Nees, which ranges from Celebes to Singapore, and the Christmas Island plant is certainly allied to that species and not to *A. coromandeliana.* I have a scrap of an apparently identical plant from the Tenimber islands (Timor Laut) collected by Mr. Pereira. The plant differs altogether in habit from *A. intrusa* Nees, which is a scrambling diffuse weed in hedges, and thickets and in its larger pure white flowers, those of *A. intrusa* being violet. The seeds of *Asystasia* are dispersed by the exploding of the capsule as in so many *Acanthaceæ* but this of course would not account for the plant's reaching Christmas Island. They are too heavy probably for wind dispersal and were probably sea borne to the island. It grows in the lower woods near the sea, on soil chiefly formed of broken coral reef.

Ruellia prostrata, Lam. var *dejecta* Clarke.

A low spreading herb about 6 inches tall. Leaves ovate or lanceolate acute base cuneate 2 inches long and one inch wide sprinkled with white hairs on both sides expecially on the nerves, petiole half an inch long hairy. Flowers solitary axillary opening in the afternoon. Corolla little more than half an inch long light violet dilated upwards. Capsule $\frac{3}{4}$ inch long base narrowed half its length them dilated pubescent. Seeds numerous orbicular flat margined above covered with minute white processes.

Flying Fish Cove common (Andrews) I could find only a few plants on some boulders close to Ross' old house.

Distribution East Africa, India, Ceylon, Malay Peninsula (type).

The variety *dejecta* is extremely different from the typical form, which is more compact with much smaller leaves, flowers much more dilated and at least twice as large. Mr. Clarke however has seen intermediate forms.

Possibly accidentally introduced, but may be dispersed by the adhesion of its minute slightly hooked seed processes, or may be sea borne.

Dicliptera maclearii, Hemsley.

A weedy plant 2 or 3 feet tall branched, growing in masses with lanceolate leaves pointed at both ends 1 to 3 inches long $\frac{1}{4}$ to 1 inch wide pubescent on both sides, petiole $\frac{1}{4}$ inch long or less flowers crowded in the upper axils, outer bracts needle-like ¼ inch long inner bracts, broadly orbicular stalked ending in a sharp needle-like point, ¼ inch long green. Calyx very small sepals linear pubescent, corola ½ inch long narrow two lipped pink. Capsule very small.

Very common on the lower terraces, Flying Fish Cove, Waterfall, Cemetery Road etc. Endemic and first collected by Capt. Maclear.

When ripe the whole of the fruit including the broad spring bracts breaks off and adheres strongly to cloth etc., by which means the seed included between the bracts is carried about.

VERBENACEAE.

Callicarpa longiflora, Lam. var *glabrescens*.

A shrub about 6 feet tall leaves opposite ovate lanceolate acuminate 7 inches long 3 inches wide edge denticulate glabrous except for some stellate tomentum on the midrib on both surfaces and on some of the main nerves, petiole ¾ inch long tomentose. Panicles about 2 inches long tomentose. Flowers numerous white small. Calyx cup-shaped glabrescent, corolla lobes glabrous. Drupe globose ⅛ inch long white.

Common on the Plateau, also the lowest cliffs and near Flying Fish Cove, collected first by Lister.

Distribution of *C. longifolia*, Lam. India, Malay Peninsula and Australia.

The common form of this plant has very tomentose leaves, covered with tufts of woolly hairs arranged stellately, its flowers also are pale lavender in color. The Christmas Island plant differs in its nearly glabrous larger and thinner leaves and white flowers.

The seed is dispersed by birds the small drupes being pulpy and sweet.

Stachytarpheta indica, L.

A low shrubby plant with brilliant blue flowers produced one or two at a time on a long erect raceme.

A few plants in Flying Fish Cove, collected also by Andrews. I met with one plant with white flowers.

Distribution all the Tropics

This occurs as a weed or cultivated plant all over the east, but seldom if ever except in waste ground.

Premna Lucidula, Miq.

A small straggling tree with obovate glabrous leaves narrowed at the base to a petiole, 3 inches long 2 inches wide or less, petiole $\frac{1}{2}$ inch long. Flowers $\frac{1}{8}$ inch across in a small terminal corymb shorter than the leaves 1 inch across tomentose. Calyx cup shaped. Corolla small white. Drupes $\frac{1}{8}$ inch long black.

Rocky places above Andrew's Lookout : collected first by Andrews, on "the first inland cliffs."

Distribution Java.

LABIATAE.

Anisomeles ovata, R. Br. A coarse much branched herb 2 or 3 feet tall, with a coarse scent.

Common Flying Fish Cove, Waterfall, cemetery road Phosphate Hill etc., in cleared ground or in open woods.

Distribution India, Malay Peninsula, and islands and China.

A more robust form than one generally meets with. First collected by Lister.

Leucas mollissima, Wall.

Herb about 2 feet tall, branched, leaves opposite ovate obtuse crenulate, shoots and both sides of the leaf especially lower surface pubescent. Flowers crowded in axillary whorls 11 or 12 in a whorl. Calyx $\frac{1}{4}$ inch long with alternate large and small teeth pubescent

Corolla not twice as long, white upper lip white pubescent, lower one glabrous.

Flying Fish Cove, Cemetery road.

Distribution Malay Islands, India.

First collected by myself in 1890.

APETALÆ.

NYCTAGINTEÆ.

Bœrhaavia repens var *diffusa.*

A branched prostrate herb branches 2 feet long pubescent. Leaves fleshy obovate rounded lower ones an inch long ½ inch across entire with 3 pairs of strong nerves on the back upper leaves much smaller, all pubescent on the edges. Flowers very small pink crowded in terminal very lax panicles with few slender short branches pubescent. Perianth pubescent. Fruit ⅛ inch long and 4 lobed aciniform viscid pubescents stamens 2 anthers very broad.

Flying Fish Cove on the beach, and along Cemetery road, and high upon bare rocks above the Cove.

Distribution all the Tropics.

This form is more robust and with thicker foliage than the Singapore seashore form, but it appears to be a very variable plant. With the typical form grew one with very condensed leafy branches, the panicle branches very short and flowers a little larger. It seems to be a monstrosity due to some insect attack.

B. repanda Willd is recorded by Hemsley from the summit. This species has not since been seen, and perhaps was an error for *B. repens.*

B. cæspitosa, n. sp.

Whole plant forming a big tuft with a prostrate mass of branches two or more feet long, tips obscurely pubescent. Leaves ovate to almost orbicular thinner than in preceding 1 inch long ½ inch wide or much less glabrous pale, nerves 2 or 3 pairs deeply sunk on the upper surface when dry. Panicles lax terminal and axillary with few branches slender viscid. Flowers very small white crowded in small terminal heads viscid. Perianth short campanulate with 5 very short lobes, subacute. Stamens two much shorter, anthers globose. Style stout stigma large thick peltate. Fruit ⅛ inch long oblong narrowed to the base with several ribs, viscid.

Flying Fish Cove.

I can quite imagine this plant, very distinct when alive, being confused with *B. repens* when dried material only is seen. It differs entirely in habit from any form of *Boerhaavia* I have seen, the flowers are invariably white. Stamens much shorter and stigma larger the fruit is ribbed but not distinctly angled as in the common plant. I have never seen it elsewhere.

Pisonia grandis, R. Br.

A big tree with a very thick stem covered with rather smooth grey bark, branchlets pale grey fragile. Leaves crowded at the ends oblong light green glabrous except the petioles, which are tomentose. Corymbs of green flowers fragrant about 3 inches long pubescent ⅛ inch long. Flowers ⅓ inch long tube short conical hardly lobed pubescent. Stamens 8 shortly exsert on fili-form filaments. Style as long pubescent stigma peltate.

Common close to the sea on rocks. Smith Point. Flying Fish Cove etc.

Distribution Australia and Polynesia, also on Cocos Island probably). (Forbes. Wanderings).

The fruit which I have not seen is said to be spiny and glutinous adhering to the feathers of birds, and is doubtless so conveyed about by the sea birds. The seeds of the Cocos Island plant often prove fatal to the herons by adhering to their feathers (Forbes lc. 30).

P. excelsa, Bl. A fairly big tree with deep green shining elliptic obtuse or acute leaves narrowed and often inaequilateral at the base 8 inches long 3 inches across, petiole 1 inch long, glabrous except for the base and axillary buds which are tomentose. The leaves are often whorled. Panicle terminal of a few umbelled branches, 1-2 inches across, on a pubescent peduncle 2 inches long. Flowers green $\frac{1}{4}$ inch long on pedicels $\frac{1}{8}$ inch long all pubescent. Perianth tube elongate conic, with very short rounded recurved blunt lobes. Stamens 8 filaments barely exsert, anthers small. Style as long stigma peltate. Fruit over 1 inch long, $\frac{1}{4}$ inch through, linear 4 angled, glabrous green exuding a very sticky gum, 1 celled.

Common on the Plateau, and the lower terraces. Flying Fish Cove etc. Not however a sea shore tree like the last.

Distribution Andaman Islands, Malay Peninsula, and islands.

This is not a very large tree, much more slender than the preceding species, the long slender fruits when ripe split and exude a very sticky substance which adheres firmly to cloth etc., and doubtless to bird's feathers.

The occurrence of this plant in the Malay Peninsula is curious as it occurs only so far as I know at Kuala Dipang in Perak, on the limestone rocks, a long way inland, but there is a native tradition that within historical times the sea came up to these limestone cliffs.

The flowers which are fewer and longer than those of *P. grandis* do not seem to have ever been previously described.

AMARANTACEÆ.

Deeringia celosioides, R. Br.

A half shrubby plant usually scandent about 12 or 14 feet long leaves alternate light green ovate or ovate lanceolate acute 6 inches long and three inches across petiole 1 inch long spikes axillary and terminal, 6 or 7 inches long. Flowers white crowded sessile, sepals 5 oblong stamens 5, stigmas 2-4. Fruit a ribbed crimson scarlet pulpy berry $\frac{1}{8}$ inch long.

Very common all along the coast over the sea, forming thickets.

Distribution India Malay Peninsula and Malay islands, New Guinea, Siam, China and Australia.

The flowers are white not red as stated Rendle. The fruit is bright red pulpy and sweet, and doubtless dispersed by birds. In the Malay Peninsula it only so far as I have seen grows on the limestone rocks in Perak, and this form has usually short inch-long spikes nearly all axillary. A plant inland at Bangtaphan collected by Dr. Keith had he says white fruits.

Achyranthes aspera, L.

A large weedy plant often quite shrubby 3 or 4 feet tall. Leaves ovate lanceolate or lanceolate acuminate at both ends pubescent 6 inches long by 3 wide. Spikes terminal and axillary 4 to 6 inches long, dense flowered bracts and bracteoles subulate with a short wing at the base, straw colored. Sepals 4 or 5 subulate $\frac{1}{8}$ inch long stamens.

Very common shore terraces, all along the coast.

Distribution Africa, India, Malay, Peninsula, Java, New Guinea, Australia and America.

The common form of this plant in the Malay Peninsula is a weed of cultivation the var *porphyrostachys* with longer and more slender spikes smaller rounds and more tomentose leaves.

The seeds are dispersed by the adhesion of the sharp sepals and bracteoles to cloth, bird's feathers etc., the whole flower breaking off.

Celosia argetea, L.

A common garden plant, grows in Flying Fish Cove by the old house etc., and also along the Cemetery Road, evidently introduced for ornament. It is visited by *Megachile rotundipennis*, *Odynerus polyhemus* and a syrphid fly.

Amaranthus viridis, L.

A common green weed ocurring everywhere in waste ground where it is warm enough for it, is very abundant in Flying Fish Cove. Phosphate Hill etc.

I believe this plant is commonly dispersed by cattle and horses which eat it and pass the seed. It comes up very commonly in manure.

A. paniculatus, L.

A tall plant with a stout stem and large lanceolate blunt leaves narrowed at the base. Spikes some axillary but most crowded into a dense erect conic thyrse 6 inches long, pale green spikes horizontally spreading 1 inch long or less, acicular; bracts squarrose; seeds deep brown or black lenticular and margined. This plant is introduced as a cultivated one and has spread a little in Flying Fish Cove. It does not seem to be typical *A. paniculatus* which is practically only known in cultivation and is very variable. I have the same form from Kuala Lumpor in Selangor.

Neither of these Amaranthi previously recorded.

BALANOPHORACEÆ.

Balanophora insularis, n. sp.

Rhizome rather small about 2 inches through or less with one or more—about 5 stems, nodular and warted. Volva irregularly split into 4 or 5 rounded lobes. Stems 3 or 4 inches tall, entirely lemon yellow, fleshy ¼ inch thick. Leaves oblong linear blunt at first appressed, later spreading, $\frac{1}{2}$ inch long $\frac{1}{4}$ inch wide upper ones smaller, subacute, margins towards the tip often denticulate Inflorescence one inch long base with scattered male flowers for $\frac{1}{2}$ inch, apex elliptic ovoid in outline blunt bisexual portiona little longer $\frac{3}{10}$ inch through. Male flowers about $\frac{1}{8}$ inch across nearly sessile. Perianth lobes oblong subquadrate truncate upper and lower ones larger than the lateral ones, at the base where the staminal thecæ are numerous, linear oblong and equal above where there are few. Andræcium transversely oblong, thecæ 7-8 or fewer hexagonal. Female flowers shortly stalked with numerous obovate tailed spadicels, ovary obovoid obtuse minutely pustulate.

Rare, on the shore terrace south of the Waterfall, on the top of Steep rock, and in the centre of the Island on Murray Hill track, a single plant at each place, growing in soil overlying detritus of coral reef. Also collected in Pulau Aur, on the east coast of the Malay Peninsula by Mr. Fielding in 1892.

The occurrence of a *Balanophora* in Christmas Island was most unexpected, and is interesting from many points of view. The species is allied not as might be expected to any Javanese species but to *B. Hildebrandti* Rchb. fil a native of Tahiti, and the Comoro islands, from which it differs in its smaller size, fewer anthers, and shortly stalked male flowers. The bisexual yellow Balanophoras have a curious distribution, ranging from the Polynesian islands, to Salayer Island.

Tenimber, Christmas Island, Pulau Aur and Comoro Island ; the species being.

B. fungosa, Forst.	
B. Hildebrandti, Rchb.	Tahiti and Comoro.
B. Micholitzi, Ridl.	Tenimber Laut.
B. Zollingeri, Fawe.	Salayer.
B. insularis, Ridl.	Christmas Island and Pulau Aur.

B. abbreviata, Bl.

All seem to be insular plants. The seeds are very light, and in *B. insularis*, a puff of wind blew those of a ripe plant away like the seeds of an orchid. The plant is doubtless wind dispersed, and although it grows very low on the ground hardly projecting more than 2 or 3 inches, in thick woods so that one would hardly expect the winds to drift its seeds high enough to cross the sea, still it has a parallel here, in the little woodland plants *Zeuxine* and *Didymoplexis*. The occurrence of the plant in Pulau Aur as well is of interest as that little island is also the only other known locality of *Sarcochilus carinatifolius*.

I could not determine what tree this plant was parasitic on. The first gathered was nearest to a *Barring tonia*; another below a *Ficus retsa*.

PIPERACEAE.

Peperomia lævifolia, Miq.

A small green succulent branched herb with alternate rhomboid lanceolate bright green fleshy leaves pale beneath, 'an inch long spikes very slender 2 inches long with minute flowers. Fruit globose minute brown closely pustular.

On tree trunks on the Plateau Common.

Distrib. Mt. Salak, and Tjapus river, Java.

P. exigua, Miq.

A small branched succulent herb, erect or half prostrate 3-10 inches long succulent stems slender pinkish branched. Leaves alternate ovate, or ovate cordate shining light green ½-¾ inch long and broad pale beneath. Spikes axillary erect very slender 1-½ inch shortly peduncled. Flowers distant. Bract ovate subacute. Fruit globose not distinctly beaked ribbed and warted.

Flying Fish Cove on rocks close to Ross' House.

This little plant has been widely spread over the east in cultivated ground especially in gardens where it come up every where, but I have never seen it wild. It occurs thus all over the peninsula, also in the Philippines and New Guinea (and is the *P. ruderalis* Schumann) and is also met with in Burmah.

P. Rossi, Rendle.

This which I did not meet with described as 3-4 inches tall with opposite leaves elliptic petioled, obtuse, black dotted with thick dense flowered spikes, round peltate bracts and a sub-globose apiculate punctate fruit.

No locality is given for it, but it is endemic.

The minute seeds of the Peperomias, might be wind borne, and most of them are more or less sticky so that they might be dispersed on bird's feathers

LAURINEAE.

Cryptocarya Nativitatis, Rendle.

A big tree with ferruginous woolly shoots. Leaves elliptic or ovate lanceolate coriaceous shortly petioled 4-6 inches by 1½-2½ inches wide. Panicles terminal 1-2 inches long, many flowered. Flowers greenish white small. Fruit globose shining black.

Common on the Plateau, and upper part of Phosphate Hill. Endemic allied to an Australian species.

The fruit is one of the great food supplies of the pigeon, though it has only a very scanty purple pulp.

Hernandia peltata Meissn.

A very big tree with ovate peltate long-stalked leaves, and corymbs of dull greenish flowers. The black globular ribbed fruit is enclosed in the yellowish white calyx enlarged to a bladder shape, but open at the top. It is 2 or 3 inches through. The fruit is doubtless sea-dispersed as the large bladdery calyx would easily float and, owing to its being weighted at the bottom with the fruit it would float upright with the aperture upwards.

It is common on the Plateau, but I did not see it on the lower terraces.

Distribution Andaman Islands, Ceylon, Lankawi and a few other places on and round the Malay Peninsula, Malay islands, North Australia, Polynesia, South Africa and Madagascar. Always a sea shore and generally an island plant.

EUPHORBIACEAE.

Euphorbia thymifolia, Burn.

A low prostrate herb common in Flying Fish Cove, on Phosphate Hill and near the Waterfall. Not previously recorded. All Tropical countries.

E. pilulifera, Linn.

An erect weed, abundant in Flying Fish Cove, Waterfall Cemetery road etc. A somewhat diffuse and more flaccid form occurred in woods near the waterfall.

Distributed over all the tropical and sub-tropical countries. First recorded by Andrews.

E. atots Forst.

A shrubby plant 2 or 3 feet tall.
Common on the bare cliffs above the sea Flying Fish Cove, Smith point, Rocky point etc. Distribution India, Malaya, China, Australia.

Phyllanthus Niruri, L.

A common weed about a foot tall.
Flying Fish Cove.

Distribution all the tropics except Australia. A weed of cultivation usually.

Croton caudatus, Geisel.

A woody climber with rough ovate leaves which turn orange red long before falling, making the plant very conspicuous. Flowers in short racemes, yellowish white.

Very abundant and often troublesome to get through. Phosphate Hill, North East Point, Andrew's Look-out etc., and on most of the shore terraces near the sea. I only met with it in male flower as did Andrews. It certainly does not seem very floriferous here.

Distribution India, Ceylon, Malay Peninsula, Java, Philipines.

This is not typically a sea shore plant. The fruit may however be dispersed by sea.

Claoxylon cærulescens, n. sp.

A large bush with white stems. Leaves light green ovate acute or acuminate crenulate dentate 6 inches long, 3 inches wide, pubescent on the back, especially on the nerves, turning indigo-blue when withering. Flower spikes woolly axillary ½ inch long. Calyx 4 lobed, lobes ovate woolly green, ovary pubescent. Hypogynous scales shorter than the sepals linear entire, stigmas entire recurved. Fruit obconic ⅓ inch long, hairy outside and in the cells green soft obscurely trilobed. Seed sub-globose wrinkled.

Common, Rocky Point, Phosphate Hill.

The fruits, seed and ovary when dried and poisoned with spirits become of a pink color. This plant is obviously the one recorded by Rendle as *Claoxylon rubescens*, Miq. based on a plant of Zollinger's collected in Java, Miquel's description is short and differs from the Christmas Island plant in most respects, thus the peduncle and petiole are described as rubescent, the top of the petiole glandulous, the base of the leaf acute, the leaf itself glabrous, the spikes graceful, and soon glabrous, not one of which characters fits this plant. There seem however to be indistinct traces of glandular structure covered with hair at the top of the petiole.

The reddish color noticed by Miquel may be due to some post mortem treatment with corrosive subhinate, for he did not see the plant alive, the bases of the leaves which are distinctly pubescent on the back, are rounded, the spikes are remarkably short, and hairy even in fruit. He gives practically no other characters which are not common to nearly all Claoxylons, so that having only his description to go on, which after all is more important than a type specimen, I consider it advisable to give the plant, a new name, alluding to the deep blue colour of the withering foliage.

Macaranga tanarius, L.

A tall tree, with peltate leaves 6-18 inches long ovate subacute gland-dotted and hairy on the nerves beneath, glabrous above, petiole long glacuous. Flower spikes panicled green. Panicle 6 inches long, male flowers very numerous and small, about 8 or more in a head surrounded by a broad entire cupshaped pubescent viscid bract nearly as long as the flowers. Capsule ¼ inch long sub-globose with 4 or 5 tails ½ inch long from the upper end; all covered with sticky viscid glands exuding a yellowish gum.

Common on the shore terraces Smith-Point, Cemetery, and below Phosphate hill on both sides, Waterfall etc.

Distribution Andamans, Malay Peninsula and islands.

The Macarangas in the Malay peninsula are usually bird-dispersed, the small pigeons being very fond of the seed. The stem of this plant is solid, though nearly all the allied species have hollow stems tenanted by ants.

Cleidion javanicum, Bl.

A shrub or small tree, leaves oblanceolate acuminate, narrowed towards the base, usually more or less dentate, glabrous bright green 6 inches long by 3 inches wide. Male spikes panicled terminal slender 3 or 4 together pubescent 2 or 3 inches long. Flowers distant tufts very small yellow. Calyx lobes ovate obtuse 4. Stamens 4 filaments very short, anthers large globose. Female panicles axillary or terminal. Fruit sub-globose 3 lobed $\frac{1}{4}$ inch long smooth. Seed sub-globose oblong slightly flattened on one side smooth grey.

Common Rocky point, Plateau, Phosphate hill.

Distribution India, Ceylon, Penang, Java.

Very variable in the form of its leaves which are usually toothed, but a very distinct looking form along the Cemetery road had all its leaves entire.

Acalypha fallax, Muell. Arg.

A. Wightiana Muell. Arg.

A common herbaceous weed about a foot tall, very hispid. Leaves ovate acuminate crenulate dentate hispid $1\frac{1}{2}$ inch long 1 inch wide, petiole $\frac{1}{2}$ inch lower leaves smaller. Spikes very numerous green $\frac{1}{2}$-1 inch long axillary. Male flowers terminal very small. Females enclosed in a broad toothed hairy bract. Capsule hairy very little longer than the bract.

Common in Flying Fish Cove.

Distrib. India, Ceylon, Malay Peninsula, Sumatra, Java.

This weed is common in waste ground round towns etc., and is probably introduced into Christmas Island accidentally by man.

URTICACEAE.

Celtis cinnamonea, Lindl.

A moderate sized or tall tree with very foetid old wood. Leaves deciduous before flowering ovate acuminate or subacute, with crenulate edges, bright green, nerves 3 prominent beneath pubescent, petiole and branches pubescent 2-4 inches long $\frac{3}{4}$-3 inches wide. Flower spikes $\frac{1}{2}$ inch long dense-flowered on the bare parts of the branches yellowish. Flowers $\frac{1}{16}$ inch long shortly pedicelled, pedicels and peduncles woolly hairy. Sepals 4 oblong glabrous. Stamens 4 filaments slender surrounding a woolly disc. Drupe green $\frac{1}{4}$ inch long obpyriform, base narrowed, and apex pointed, on long slender axillary peduncles 2 inches long.

Common Flying Fish Cove, Phosphate Hill, North East Point, Plateau etc.

Flowering October, and one tree fruiting the same time.

Distribution India, Ceylon and Malay Islands, absent so far as is known from the Malay Peninsula.

The seeds are probably dispersed by birds as those of the allied *Gironniera* certainly are. The horrible odour of the dead wood is caused by scatol, which is often deposited in crystals in cracks in the bark. I observed a number of pigeons (*Carpophaga*) in a flowering tree apparently eating the young flowers.

Trema amboinensis, Bl.

A common shrub or almost a tree about 12 or 14 feet tall. Very abundant in Flying Fish Cove and at the lower part of Phosphate hill, forming a great part of the secondary scrub after clearing. The small red drupes are eaten by birds, but as this appears to be a comparatively late introduction into the island, and has spread no further than cultivated ground it may have been accidentally introduced by man.

Distribution India, Siam, Andamans, Malay Peninsula and Islands, Australia, Polynesia.

Ficus retusa var *nitida.*

A large spreading tree with very many strong aerial roots. Leaves small coriaceous dark green shining oblong or elliptic blunt or rounded at the tip or subacute, base cuneate 2-3 inches long 1-1½ wide. Figs globose as big as small peas, green. The flowers are mostly distinctly pedicellate.

Common over the whole island. Fine trees occur about Flying Fish Cove and on the Plateau, and also near the Waterfall. It is very abundant too on Steep rock.

Distribution India, Assam, Burmah, Malay Peninsula and Islands, Philippines, South China, New Caledonia and Australia. The var *nitida* India, Burma and Malay region.

Sir George King describes it as having "a few aerial roots" but it produces very many of large size.

F. saxophila, Bl.

A short stout much branched tree about 20 feet tall. Leaves quite glabrous thinly coriaceous ovate cordate at the base and subacute or blunt at the tip 5 inches long 3 inches wide, petiole 3 inches long. Figs clustered in the upper axils sessile half an inch long, yellow or crimson scarlet shortly beaked, bracts ovate pubescent. Achenes keeled or angled fusiform dark red. Female flowers with 4 lanceolate acute narrow sepals.

On Andrew's Look-out, and also on steep rock, and about Flying Fish Cove, on rocks.

This differs from *F. saxophila* of King's Annals of Calcutta Garden vol. I. p. 17, pls 12 and 8. in the blunter leaves, much larger figs, and the bracts being pubescent which he does not mention, but he says that the plant is not well represented in herbaria. It is however doubtless the plant intended by Blume.

Distribution Java Timor and Buru. The fruits in the tree at Andrew's Lookout though apparently ripe were yellow, those at Steep Rock of a brilliant red.

Laportea crenulata, Gaud.

A shrub or small tree with grey white bark and hollow branches. Leaves deep shining green glabrous above and often beneath except for a few stinging hairs, edge usually undulate or almost crenulate, blade broadly oblong ovate base rounded to oblong lanceolate narrower 10-15 inches long 5 to 8 across, petiole 2 to 6 inches long. Male panicles 1-2 inches long axillary below the leaves, armed with stinging hairs. Flowers in small clusters globose, stinging. Females panicles much longer lax a foot long or less covered with stinging hairs. Flowers very small green 4 sepals hairy, style longer. Achene discoid $\frac{1}{8}$ inch long flat wrinkled or warted.

Common in Flying Fish Cove, Phosphate Hill Waterfall etc.

Distribution India, Malay Peninsula, Siam, Sumatra, Java, Borneo.

Apparently very variable in foliage if all the forms included are of this species. It is well known from its stinging powers which however vary a good deal some being very severe stingers, others sting hardly at all. The Christmas Island one stings somewhat severely.

L. Murrayana, Rendle.

A tree about 20 feet tall with pale bark branches hollow. Leaves ovate or orbicular peltate acute or obtuse 3-7 inches long 2-4 wide nearly glabrous light green. Male panicles 2 inches long glabrous. Flowers in small distant clusters, buds globose, sepals four obovate obtuse glabrous. Stamens very short 4. Pistillode globose. Female panicles 3-5 inches long much more diffuse. Flowers very small in small tufts. Stigma much longer. Achene discoid $\frac{1}{16}$ inch across margined.

Flying Fish Cove, on rocks near the magistrate's house, apparently unsexual. I only saw two or three trees, which flowered at the end of October. The leaves sting and the flowers are green. Rendle says it is near *L. laxiflora* of Java, which has leaves pubescent beneath and the female infloresence larger than the petioles, but in my specimens the infloresence of the female plant is certainly longer than the petioles.

Cudrania javanensis, Trecul.

A big woody climber, with pale branches and strong $\frac{1}{2}$ inch spines. Leaves very variable from lanceolate acuminate to elliptic obtuse 1-3 inches long $\frac{1}{2}$-1$\frac{1}{2}$ across, glabrous, petiole and branchlets pubescent and the nerves of very young leaves also. Male flowers in small yellow balls $\frac{3}{16}$ inch across leaves shortly peduncled pubescent. Sepals cuneate hairy; stamens 4. Female heads twice as large style. Fruit a fleshy head of drupes.

Very common Rocky point, Phosphate hill, Plateau etc.

Distribution East Africa, Ceylon, India, Malay Peninsula and Archipelago, Australia.

An abominably spiny plant with deep green leaves forming a bush in open places but a big climber with a stem as much as 4 inches through in the forest. The style in all the specimens I have seen from Christmas Island is simple.

Fleurya ruderalis, Gaud.

A common weed about a foot tall herbaceous with ovate crenate subacute leaves 2-4 inches long, sparsely hairy or nearly glabrous with rather long petioles. Panicles axillary lax but numerous much branched 1 inch or less long, the flowers in small peduncled tufts. Achenes very small, smaller than in *Fl. interrupta* ovate flattened edge thickened and ribbed, beaked.

Common, Flying Fish Cove, Smith Point.

Distribution Java.

This plant was first collected by Lister and as no one had lived on the island previously it may be taken that it was not introduced by man, but I could not find it on Christmas Island except in cleared cultivated spots, and at places where fishermen went to fish off the rocks. On frequented tracks it often occurred but not off the tracks, so that it is certainly now carried about by man.

The common species in the Malay Peninsula is *Fl. interrupta.*

Boehmeria platyphylla, Don.

A shrub or very soft wooded tree about 18 feet tall, branches pubescent hairy. Leaves soft green ovate acuminate crenulate dentate base rounded 3-6 inches long 3-4 inches wide, sprinkled with short hairs above, silky pubescent beneath, petiole 1 to 3 inches long. Male panicles 1 to 3 inches from the axils of the upper leaves, branches an inch or less long. Flowers small globose clustered in distant heads. Calyx cupshaped pubescent with four short acute lobes. Stamens 4. females rather longer and slender. Flowers much smaller silky pubescent stigma very slender. Achene minute ovoid or fusiform, angled covered with sticky pubescence.

Common Flying Fish Cove, Phosphate Hill.

Distribution Africa, India, Ceylon, Sumatra, Java.

This shrub stings about as badly as the Laportea.

Proctis pedunculata, Wedd.

A succulent herb hardly shrubby with bright green fleshy stems and leaves. Leaves 5-6 inches long 1½ inch wide entire obliquely lanceolate acuminate, shortly petioled, nerves 4 pairs alternate, opposite leaves reduced to a oblong lanceolate or ovate lamina ¼ inch long male panicles 1 inch long, peduncles slender branches 3. Flowers very small in cymes green.

Female flowers in small sessile heads $\frac{1}{4}$ inch through. Achenes small lanceolate acuminate punctate brown.

Abundant on the shore terraces and Plateau growing on rocks.

Distribution Mascarene Islands, Malay Islands, Polynesia.

UNIDENTIFIED PLANTS.

A. A big tree about 80 feet tall with thick stem covered with flaky bark, branches smooth. Leaves alternate ovate or elliptic acute glabrous deep shining green, 6 inches long 4 inches wide, nerves 6 pairs anastamosing within the margin petiole one inch long, Panicles terminal. Flowers minute $\frac{1}{16}$ inch long, sepals 5 free nearly to the base ovate pubescent, petals 5 as long subspathulate or ovate pubescent. Pistil superior. Fruit a yellow berry $\frac{1}{4}$ inch long, sepals persisting below, globose ovary 2 celled 2 ovuleds.

Not common, Flying Fish Cove, and along road to Cemetery.

This fine tree appears to be a *Mappia* (*Olacineae*) but I was unable to get complete flowers of it. There is a small piece of what appears identical with this plant in the Singapore herbarium apparently collected by Mr. Canttey in Singapore, but I have never seen the tree elsewhere in the Peninsula.

B. A big woody climber, climbing to the tops of the trees on the plateau. Branchlets stout covered with a deciduous ferruginous tomentum. Leaves alternate or subopposite elliptic subcoriaceous 6 inches long by four inches wide obtuse base broad glabrous above; midrib beneath elevated red tomentose, and lamina finely gland dotted, nerves about 10 pairs alternate elevated, reticulations transverse distinct when dry, petiole thick $\frac{1}{4}$ inch long red tomentose. Flower spike axillary peduncled, but too young to give any further information about it.

This is a very common liane all over the plateau, but all search for flowers or fruit was in vain except of a very young spike once found. It does not seem to have been collected by any previous botanists.

C. A medium-sized tree, branches slender covered with rather stiff appressed pale hairs. Leaves opposite lanceolate acuminate 4 inches long, one and a half inch wide, nerves about 8 pairs not very distinct, dull green nearly glabrous except for a few hairs on the midrib beneath petiole ¼ inch long.

Common in the Plateau woods and on Phosphate hill, I could find no trace of flowers or fruit.

D. A shrub abundant at Waterfall bay on the rocks in the wood, very closely resembling *Clerodendron* inerme and possibly it, but I could not find a trace of flowers or fruit though I visited the place at several periods.

MONOCOTYLEDONS.

ORCHIDEÆ.

Dendrobium pectinatum, n. sp.

D. Macraei Rendle (not of Lindley).

Creeping stems ¼ inch through closely jointed, branches numerous 6-12 inches long greenish yellow pseudobulbs elliptic oblong flattened 1½ inches long ½ inch wide. Leaf lanceolate obtuse coriaceous 3 inches long 1 inch wide. Flowers opening singly ½ inch long pale yellow sepals lanceolate acute. Petals narrower lanceolate. Lip shorter, claw narrow linear, blade somewhat dilated, slightly retuse with numerous very narrow linear filaments on each side.

Abundant on trees on Phosphate Hill and the Plateau, flowering October.

Dendrobiums of the section *Desmotrichum* are very difficult to describe from dried specimens, as the flowers are of thin texture and very fugacious, and as they only open for a few hours in the morning and are withered by midday. It is not often that collectors can procure good specimens. These are no doubt the reason why there has been so much confusion over these plants and for the identification of the Christmas Island plant with *D. Macraei* Lidley a species apparently confined to Ceylon, and utterly different, belonging indeed to a different, subsection.

In the Flora of British India, a number of different species are recorded as synonymous with *D. Macraei*, including the Himalayan *D. Rabani* and Javanese *D. flabellum*, a plant with large red spotted flowers. *D. pectinatum* is more nearly allied to the *D. calopogon* Rihb. fil, Xenia, Orch. p. 23 pl. 109, fig. 1. 2. of unknown locality but differs in the form of pseudobulb and narrow claw of the lip, and I cannot identify it with any described species. A considerable number of Javanese Desmotrichums were described by Blume in the Bijdragen, but as in most of his early work so badly that it is utterly impossible to guess at what he meant, and thus they had better be relegated to the class of *nomina nuda* and ignored.

***D. crumenatum*,** Sw.

Common all over the island especially on trees on the Plateau. The plant which is quite typical, was scantily in flower at the time of our visit. I obtained it in 1890 and Andrews also got it.

Distribution, Malay Peninsula and Islands, Southern Siam.

Phreatia Listeri, Rolfe.

A small orchid with greenish white flowers in slender spikes. Common on trees on the Plateau.

Endemic. Collected also by Lister and Andrews.

Ph. congesta, Rolfe.

A small orchid with tufted spikes of white flowers. Common on trees on the Plateau. Endemic.

Saccolabium Archytas, Ridley.

Very common especially on the trees of the lower Terraces. Endemic. This pretty plant grows in masses on the bare trunks of the Gyrocarpus and other trees. The flowers are white with pink spots.

Dendrocolla carinatifolia, Ridley.

Sarcochilus carinatifolius, Ridley.

Less common than the last, and chiefly on the trees on the Plateau. One plant I found had the petals of a pale ochre colour.

Collected also by Andrews. It occurs also on Pulau Aar, an Island off the East Coast of Johor.

Thelasis elongata, Bl? A quantity of plants of a *Thelasis* resembling *Th. elongata* Bl. occurred on trees in the plateau near Murray Hill, no trace of flowers, was to be seen, and I have failed to flower it in the Botanic Gardens. *Thelasis elongata*, Bl. is a native of Java.

Corymbis angusta, n. sp.

Stems 2-3 feet tall slender woody. Leaves lanceolate acuminate acute, dark green 8-11 inches long 2-2½ inches wide speaths ribbed. Panicles 2 or 3, 4 inches long lax. Bracts ovate lanceolate acute ⅙ inch long. Pedicels ¾ inch long rather slender. Flowers white smaller than usual. Sepals 1¼ inch long very narrowly linear. Petals similar. Lip as long, claw very long and narrow channelled, limb ovate shortly cusped edges crisped, ¼ inch across and little longer. Column slender 1 inch long, anther lanceolate blunt. Stigma ovate triangular. Rostellum very small narrow deeply bifid. Chinandrium sides winged. Fruit 1 inch long as long as the column costae very narrow.

Common on the plateau and occasionally descending to the lower reefs, in forest. Flowers fragrant.

The genus *Corymbis* includes about six or seven species ranging from tropical Africa to Australia. All it is true are closely allied, and the differences are so slight in many that one would be almost inclined to consider them as forming one species only. There are few forms however as distinct specifically as the Christmas Island plant. In habit it is slender and weak, very different from the tall stout *C. veratrifolia* Bl. with which it has been confused by Rendle, but this might have been due to the peculiarly dry locality in which it grows. The flowers are smaller, and the extremely narrow petals and sepals, long narrow claw to the lip, the limb of which is more ovate and much smaller, and the different form of the clinandrium which has thin elevated wings on either side, and of the small narrow rostellum and broader stigma, make it quite distinct from the Javanese and Malayan species.

Didymoplexis pallens, Griff.

A small terrestrial orchid. Stem slender 4 inches long in flower becoming stouter and growing to 8 inches tall in fruit. Leaves $\frac{1}{16}$ inch long ovate. Flowers 2 or 3, shortly pedicelled flesh-colored. Sepals oblong obtuse. Petals ovate obtuse. Lip entire with 3 nerves not elevated, numerous scattered papillae and a raised mass at the tip of crowded papillae, apex broad crisped denticulate. Column broad, anther rounded flat papillose. Wings obscure. Stigma transversely elliptic. Pedicels lengthening in fruit to 6 inches long. Capsule globose, with slender ribs $\frac{1}{2}$ inch long.

Woods in the centre of the island towards Murray Hill. This plant is always difficult to find. I got 3 specimens in flower and one in fruit, growing among a carpet of *Acrostichums.*

I cannot distinguish this plant from the *C. pallens* of India and the Malay peninsula. It is probably a native too of Java, but I am doubtful as to the *D. pallens* of Smith in the Ic. Bogor, found at Buitenzorg.

Zeuxine exilis, n. sp.

Whole plant 12-18 inches tall succulent, rhizome shortly creeping, roots fleshy. Leaves lanceolate acute light green 1-3 inches long ½-¾ inch wide glabrous, shortly petioled, sheaths papery ½ inch long. Stem white-hairy, peduncle (portion of stem above leaves) 3-6 inches long, raceme many flowered 1-3 inches long. Bracts lanceolate acuminate hairy. Sepals reddish hairy lanceolate acute ⅛ inch long. Petals thin white adnate to the upper sepal. Lip base saccate with broad wings, then narrowed, limb broadly bilobed, lobes broad oblong divaricate edges crenulate, processes in the base of the lip 2. slender subulate curled, whole lip white with a central yellow bar. Column short, anther lanceolate beak up curved dull red, pollinia elongate pyriform, disc large oblong. Rostellum lobes linear acuminate. No accessory processes. Capsule pubescent elliptic ¼ inch long.

Centre of the island, among ferns not rare.

Endemic.

AMARYLLIDEAE.

Crinum asiaticum, L. The common white *Crinum* of the Indo-Malayan shores, is abundant on the rocks in many places, e.g. Andrews Look-out, N. E. point, at the Waterfall and Rocky point. It grows in clefts in rocks often in somewhat inaccessible places over the sea, and occasionally on the more inland terraces. The form is quite typical. It commenced to flower at the close of our stay and fruit were also found. It is a natural flowering plant, and a certain attraction for *Sphinx Convolvuli*, of which insect I took two or three at the flowers of plants growing in the Settlement at Flying Fish Cove, this being the first record for this almost ubiquitous hawkmoth in the island. The large corky seeds are sea-dispersed being well adapted for this. Plants however occur often abundantly in hollows in rocks far from the sea at the present time, and at a great height above it, suggesting that the ancestors of these plants were there at the time when these now inland reefs were close to the sea. The plant though doubtless rapidly dispersed by sea, moves but slowly inland and apparently climbs up the rocks in the following manner. The long peduncles after flowering droop as the fruit develops till it reaches the ground when the seeds all fall and usually lie in a pile on the ground, where some at least germinate. On the sloping rock-faces the peduncles which fall towards the upper slope drop their seeds thus about four feet above the parent-plant, and so it creeps gradually up. Seeds from peduncles which droop downwards over the precipice either fall into the sea, or into the woods at the base of the precipice where they can seldom grow. Around the Malay coasts the plant almost invariably grows in sand or mud, close to the sea, but there is hardly any suitable place for this on Christmas Island as all the shores are mere masses of coral fragments turned over by the waves in the seasons of gales, and with no soil beneath. It grows however well enough where there is soil in Flying Fish Cove.

Crinum Asiaticum, L. is distributed over India, Ceylon, the Malay Peninsula and Islands Admiralty Isles, Japan and North Australia, Polynesia, Fiji Islands.

PALMÆ.

Arenga Listeri, Becc.

A single stemmed palm about 30-70 feet tall and 6-15 inches through, grey and distinctly ringed.

Spathes 4 or 5 lanceolate acuminate coriaceous pale brown ribbed and keeled towards the tip 6-8 inches long 1¼ inch across, spadices numerous about 2 feet long with numerous spikes 18-24 inches long male flowers, calyx-lobes 3 rounded imbricate. Petals ¼ inch long spathulate woody yellow.

Stamens shorter about 40, filaments connate at the base, free about half their length, slender filiform, anthers linear oblong.

Fruit oblong elliptic ½ inch long pink, 3 seeded. Common all over the island but chiefly on the upper terraces. When the tree has fruited all the leaves fall off and the dead or dying stem with the inflorescences persisting has a most curious appearance. The spadices are in threes 2 males and 1 female. They are only produced about half way down from the top not down to the base as in the other species of the genus. The flower has a musky scent.

Endemic, and not closely resembling any other species. The fruit is much more like that of a *Didymosperma* being small elliptic and pink with 3 seeds elongate flattened acute at both ends, pale brown. It is very difficult to get ripe seed of this plant, as soon as the fruit is ripe hundreds of the large robber crabs swarm round the tree and devour the seeds, crushing them in their jaws. They do not eat the pulp of the fruit. Hardly one seed is left and only those survive which have fallen into cracks, or got somehow covered up and concealed from the crabs. The young shoot of the palm is excellent either raw or cooked, and formerly I procured some excellent flour made from the stem.

PANDANEÆ.

Pandanus nativitatis, n. sp.

A bushy pandan with branched stems, about 8-14 feet tall. Leaves six feet or more long 2 inches wide linear acuminate edge and keel with close-set pale thorns. Male spadix a foot or more long. Bracts about 10 linear acuminate 2 feet long or less 1 inch wide white. Branches of spadix 2 inches long or less numerous, acuminate not candate. Stamens very numerous in racemes, anthers linear mucronate much longer than the filaments which are very short.

Fruit as big as a man's head orange when ripe, rachis stout 6 or more inches long. Syncarps of 5 to 22 carpels, 2 inches long oblong, top broad, ½ inch wide irregularly angled. Stigmas little elevated.

Common along the coast edges forming dense almost impenetrable thickets along the whole coast line above the sea. Very near *P. Forsteri* of Lord Howe's Island. This has just the habit and general appearance of *P. odoratissimus*, L. the plant that is so common along the Malay coasts, but it is less glaucous, the leaves and bracts not tailed, the syncarps a little shorter and broader and more deeply grooved. The male flowers are indistinguishable.

P. elatus, n. sp.

Stems few together 40 to 60 feet tall 6 inches through very hard with numerous short hard aerial roots at the base, grey and sparingly thorny, above with a few erect branches. Leaves when young 6 to 10 feet long, adult 6 feet linear acute 4 inches across thorns at the base and tip very numerous and close bases swollen tip red brown ⅛ inch long more distant in the middle of the leaf, and distant on the keel. Male spadix dense about 8 inches long. Bracts over a foot long linear acuminate hardly thorny. Spikes very dense 6 inches long 1 inch through or shorter. Stamens fascicled on a short stem, anthers crowded at the top, filaments short anthers oblong obtuse shortly mucronate. Fruit on a peduncle 2 feet long and 2½ inches thick, oblong 12 to 15 inches long 7 inches through. Syncarps 1½ to 2 inches across and ¾ inch wide. Drupes 9 to 10 or fewer in a syncarp glaucescent bluntly angled tops free, 3 inches long ½ inch or less through style short. Stigma ovate acute sloping nearly ¼ inch long. Common in the interior on the Plateau. Endemic.

AROIDEAE.

Remusatia vivipara, Schott.

This was obtained by Andrews on the Phosphate Hill Road in January no one has seen it there before or since. I carefully sought both the old road and the new one and the surrounding region in vain for it. But possibly it had temporarily vanished during the hot and dry season. It should be looked for again in the rains.

The plant occurs in India, Ceylon, Siam and Java but is apparently absent from the Malay Peninsula proper.

CYPERACEAE.

Cyperus Iria, L.

Small plants of this very widely distributed sedge were found at Smith Point.

It was evidently a recent introduction, as it was not seen by Andrews, and seemed hardly to have established itself.

Mariscus albescens Gaud, *Cyperus pennatus*, Lam.

This fine rough sedge with its great tufts of stiff glaucuos leaves and panicles of pale brownish spikelets, grows on the basaltic rocks over the sea just beyond the Waterfall. It was nearly out of flower at the time of our visit and had not previously been seen.

It is a common sea shore plant distributed over Tropical Africa, India, Ceylon, Malay Peninsula and Islands, Australia and Polynesia.

Apparently it would not grow on the limestone rocks, being confined to the basaltic outcrop.

Fimbristylis cymosa, R. Br.

A narrow leaved tufted sedge forming clumps resembling those of the Thrift (*Armeria*) in rocky dry spots above the sea. This was first recorded from the island by Hemsley from Lister's collection and was overlooked by Andrews. It is very common on the rocks by the wharf in Flying Fish Cove, Smith Point, beyond north-east point, and at the Waterfall and beyond towards Steep Point. It occurs in Polynesia, and Australia.

GRAMINEAE.

Paspalum conjugatum Berg. This grass probably of South American origin, and now abundant in the Malay Peninsula has quite recently been introduced, accidentally, and has hardly established itself yet. It was met with at the wharf, and occurs too in Flying Fish Cove by one of the houses.

P. sanguniale var *commutatum.*

Common all over the area cleared for cultivation and along paths. There are three forms of this, one the typical form with broad leaves and several spikes. Another with narrower leaves and narrow finely ribbed glumes. At Flying Fish Cove and Phosphate hill ; and a dwarf tufted form with narrow bright green foliage, slender and few spikes and slightly ciliated glumes. This grows on Phosphate hill and in Flying Fish Cove and the Waterfall in dry open spots.

The plant is distributed over nearly all the regions warm enough for it and is very variable, but all the forms here belong to the variety *commutatum.* It had reached the island by 1890 when I saw it there, but was not collected before that, and I do not think it is indigenous.

P. colonum, L.

This common grass occurs in Flying Fish Cove in no great abundance. It is probably of recent introduction as it was not collected by Andrews.

It is common all over the tropics and warmer parts of the world.

P. Andrewsi, Rendle.

This elegant grass described by Rendle in the monograph of Christmas Island p. 192, and figured on Pl. XVIII of that work, seems to be very local. Andrews gives no specific locality for it, and I sought it unsuccessfully everywhere till I found it on the basalt outcrop above Flying Fish Cove. The plants, were almost completely dried up, and those I found were much more elegant than the figure represents. It is more graceful and slender than *P. ovalifolium.*

Distribution Timor.

Panicum clivale, n. sp.

A tufted grass with a short creeping rhizome about 6 inches tall, stems slender. Leaves narrow linear acute glabrous 2 inches long $\frac{1}{8}$ inch wide, ligule ciliate. Panicle slender few branched erect, branches scabrid. Spikelets solitary shortly pedicelled with a sinuous slender scabrid barren branch subtending each, about $\frac{1}{4}$ inch long. Pedicel of spikelet very short with a cup-shaped top spikelet ovoid barely $\frac{1}{8}$ inch long. Glume I. ovate subacute small. Gl. II. more than twice as large ovate obtuse 3 ribbed purple. Gl. III. ovate lanceolate twice as large as Gl. II. purple. Glume IV. white crustaceous finely dotted large lanceolate boatshaped Palea thin lanceolate narrower.

Very local on the dry earth above Tom's Ladder, in Flying Fish Cove not previously collected.

Setaria glauca, Beauv. A single plant of this almost world-wide weed of cultivation was found by me on Phosphate hill on ground cleared by the Chinese for cultivation. It occurs nearly all over the world.

Oplismenus compositus, Beauv.

Perhaps the most abundant grass on the island, growing all through the more open woods. It is the best fodder grass on the island and is regularly collected for the horses and cattle. As it is so widely distributed in the island I surmise that it is indigenous, though it was not obtained by Lister. Andrews however collected it and found it abundant. There are two forms here, one tall with long spikes the other more compact. Distribution, all tropical and warm countries.

Ischaemum foliosum var *leiophyllum*, Hack.

A somewhat variable usually tufted grass growing on the rocks above the sea, from beyond Smiths' Point to Flying Fish Cove, and along to near the Waterfall but scarcer on this coast. It does not grow inland. Rendle suggests that it is probably only a form of *I. ciliare*, but no two species could be more different in habit and structure. It is the *I. murinum* Forst, of Hemsley's list. The plant varies somewhat. Specimens growing in less exposed places are taller and more flaccid than those of the much exposed places. The spikelets break off when ripe and are drifted along the coast by the wind. One often sees little piles of them in holes on the rocks. Distribution New Caledonia.

Eleusine indica, L. This common grass is abundant on Flying Fish Cove and Phosphate Hill and near the Waterfall. It only occurs in cultivated ground, and is evidently introduced. It first appears in Andrew's collection.

Distribution all warm countries.

Eragrostis plumosa, Link. A pretty feathery grass forming large tufts, very abundant in dry open places. Flying Fish Cove, Smith Point, Waterfall.

First collected by Lister and doubtless indigenous.

Distribution. Africa, India, Malaya.

Lepturus filiformis, Br.

A grass 6-8 inches tall, forming a thick soft mat, stems branched. Leaves linear setaceous 1½ inch long, narrow glabrous, margins denticulate at tip. Ligule short not ciliate. Spikes solitary fragile very slender 2 inches long, joints articulate deeply excavate on one side, 1 flowered. Glume I. very small linear spathulate. Gl. II. lanceolate acuminate strongly 8 inch nerved tip and margins denticulate ¼ inch long. Gl. III. lanceolate acute shorter base pubescent not nerved. Palea oblong lanceolate obtuse. Grain elliptic oblong smooth. Second rudimentary flower, a small linear spathulate organ.

Abundant near the Waterfall and to the north along the cliff edge, also occurring towards steep point, and sporadically at Smith point.

Distrib. Ceylon, Malay Islands, Australia, Polynesia.

Always a sea shore plant the spikes break up readily into joints and are doubtless sea drifted.

GYMNOSPERMS.

Cycas circinalis var *javana*, Miq.

A tall plant about 20 feet high, with rather slender pinnae to the leaves. I did not see fruit or flowers, Andrews says it grows all round the island and is most plentiful on the upper terrace at the west end of the south coast. I found it comparatively scarce, and the plants all isolated, one in Flying Fish Cove, one on Phosphate hill, one near Andrew's Lookout, and one on Steeprock. Except the one in the Cove, all were on the upper terraces a good way from the sea. This is interesting as the seeds of *Cycas* are typically sea disseminated, and these plants though growing on the coral rocks formerly washed by the sea, are now far out of reach of the waves, and the plant probably reached the island in its early days. I saw no young plants and it does not appear to be spreading. I am not sure as to the species of this plant but have followed Rendle in the name. The pinnae are much more narrow than in *C. Rumphiana*, the common Malayan species.

FERNS.

Trichomanes parvulum, Poiret.

On trees on the Plateau, (Andrews.) I found very young plants of a species of *Trichomanes* probably this, on the Plateau.

Distribution, Madagascar, Malaya, Polynesia.

Davallia solida, Sw.

Very common on trees on the Plateau, etc.

Distribution. Malay Peninsula and Islands, Polynesia.

D. dissecta, J. Sm. On trees and rocks Plateau, N. Coast, etc.
Distribution Java.

D. speluncæ, Baker.

One frond brought by Andrews. Common in Flying Fish Cove and on the road to the Waterfall.

Distribution most warm regions.

Pteris quadriaurita.

Near houses in Flying Fish Cove and one young plant along the track to the Waterfall. Doubtless a recent introduction. It often turns up in this way in the Malay Peninsula.

Asplenium Nidus, L.

Very common on trees on the plateau. First collected by Lister.

Distribution, tropics of the old world.

A. falcatum, Lam.

Common on trees on the plateau. First collected by Lister.

Distribution Africa, India, Malaya, and Polynesia.

A. centrifugale, Bak. Journ. Linn Soc. XXV p. 360.

This endemic fern was first found by Mr. Lister. It seems very rare as Andrews did not find it, and I only found a small plant of what I take to be this on the rocks, at Tom's Ladder in Flying Fish Cove. My plant is very small only about 3 inches tall.

Nephrolepis exaltata, Schott.

Rocks, West End of Flying Fish Cove.

Distribution, Tropics.

N. acuta, Presl. Common on the ground all over the Plateau, etc.

Distribution, Tropics.

N. ramosa, Moore. A very pretty fern with a slender rhizome creeping up the trunks of trees on the Plateau near Irvine Hall.

Distribution. Africa, Ceylon, Malaya, Australia.

Niphobolus adnascens, Sw. A very abundant epiphytic fern on tree trunks; Flying Fish Cove, Plateau etc.

Distribution, Africa, India, Malaya, Polynesia.

Pleopeltis irioides, Lam.

Epiphytic on trees and rocks Plateau. Very fine large plants. One frond forked at the tip was found.

Distribution Africa, India, Malaya, Australia, Polynesia.

Pl. phymatodes, L.

On rocky cliffs above Flying Fish Cove, scarce. This form had the sori in two rows only. Not previously recorded. Distrib. Africa, Ceylon, Malaya, Polynesia.

Vittaria elongata, Sw. A common epiphytic fern on trees on the plateau, a large form. Distribution Africa, India, Malaya, Australia, Polynesia.

Lastræa dissecta.

A big fern common at Flying Fish Cove and Phosphate hill.

Distribution, India, Malaya, Polynesia, Madagascar.

L. Blumii, Nees. *Nephrodium intermedium* Baker.

Collected by Lister, I did not meet with it.

Distribution India, Malaya.

L. syrmatica.

Flying Fish Cove. Common.

Distribution, India, Malaya.

Aspidium polymorphum, (Bak).

North West Point not common (Andrews) I did not get to this locality and saw the plant nowhere.

Distribution, Indo-Malaya.

Pleocnemia membranacea (*Aspidium membranaceum*, Hook).

Abundant on the plateau and the sloping talus of Flying Fish Cove. A most attractive bright green fern, Andrew's gives it " on trees everywhere " but it is always terrestrial.

Distribution, Ceylon, Malay Islands, China.

Nephrodium truncatum, Presl.

On the wet rocks of the fresh-water stream near the Waterfall. Doubtless the same spot at which Andrews got it.

Distribution, Indo-Malaya.

Gymnopteris flagellifera.

Very common all over the plateau densely covering the ground in parts. Andrews gives it as rare but it grows in very extensive patches and is very abundant

Distribution India, Malaya.

G. Listeri, Bak.

Abundant on the Plateau. This grows like the last in great masses on the ground, often mixed with the other species but more frequently alone, also on Phosphate Hill.

Endemic.

LYCOPODIACEÆ.

Lycopodium phlegmaria, L.

Fairly common high up on trees, on the Plateau.

Distribution tropics of the old world.

Selaginella rupicola, n. sp.

A slender plant 6 inches tall with few sub-erect branches, rooting for half or more than half its length, stem terete below, angled above. Leaves dimorphous ovate sub-clasping obtuse edges ciliate 1/16 inch long, distant; the others much smaller ovate cuspidate ciliate. Spikes $\frac{1}{4}$ inch long. Bracts dimorphous, sterile ones boat shaped subacute edges ciliate, fertile ones ovate cuspidate ciliate keeled.

In holes in the rock at Smith Point rare. Endemic.

MOSSES.

Identified by Mr. A. Gepp.

Fissidens Hollianus Doz. and Molk. Bry. Jav. I. p. 4 t. 4.

On the Plateau, a new record.

Leucobryum chlorophyllosum, C. Muell.

On the Plateau, collection also by Andrews.

Distribution, Sumbawa, Celebes.

Leucophanes glaucescens, C. Muell.

With the last, a new record.

Thyridium fasciculatum, Mitten.

Waterfall, Phosphate Hill common: also collected by Andrews.

Distribution Indo-Malaya, Polynesia, Chile, Mauritius.

Trachymitrium revolutum, Hampe, Christmas Island, no special locality, collected by Andrews.

Java and Borneo.

Syrrhopodon revolutus, Dozy. and Molk.

Phosphate Hill, new to the flora.

Orthorrhynchium philipinense, C. M.

Phosphate Hill, new to the flora.

Neckera Lepineana, Mont.

Plateau, also collected by Andrews.

Distrib. Malay Archipelago, Oceania, Mauritius.

Neckera lorifarmis, V. D. Bosch.

Plateau, new to the flora.

Callicostella Prabaktiana, V. D. Bosch.

Irvine Hall, new to the flora.

Taxithelium instratum, Broth.

Common, Plateau, Phosphate Hill, new to the flora.

Thuidium plumulosum, Doz. and Molk.

Christmas Island, no special locality (Cole Andrews.)

Distrib. Ceylon, Malaya, Oceania.

Hypnum Montagnei, Lec. Christmas Island, no special locality Coll. Andrews.

Distrib. Java.

Isopterygium Jelinkii, (C. Muell.) Fleisch.

Common all over the hill Plateau. (Identified by M. Fleischer.)

Ectropothecium micronesiense, Fleisch.

Common Flying Fish Cove. Phosphate Hill, Irvine Hall, etc., a new species.

HEPATICS.

Identified by Mr. A. Gepp.

Ptychanthus squarrosus, Mont.

Christmas Island, no specific locality (Coll. Andrews.)
Distrib. Malay Archipelago.

Pt. striatus, Nees.

Plateau, a new record.

LICHENS.

Leptogium sinuatum, Kalchbr.

Phosphate Hill, a new record.

L. phyllocarpum, Nyl ? Christmas Island; no specific locality (Coll. Andrews.)

Usnea trichodea, Asch.

Common on the Plateau; also collected by Lister.

U. articulata, Hoffm.

Common on Phosphate Hill. New to the flora.

Ramalina callicarpis, Fries.

Flying Fish Cove, Phosphate Hill, new to the flora.

R. fraxinca, Ach. Christmas Island; no special locality (Coll. Andrews.)

Parmelia perforata, Ach.

Phosphate Hill, new to the flora.

P. tinctorum, Despr.

Christmas Island; no specific locality (Coll. Andrews.)

P. appendiculata, Fee? Christmas Island; no specific locality (Coll. Andrews.)

Physcialicta, Nyl. Christmas Island, no specific locality (Coll. Andrews.)

Lecanora, sp.

Phosphate Hill, with *Parmelia perforata* Asch.

L. varia, Asch. Christmas Island, no specific locality (Coll. Andrews.)

Lecidia lutea, Schaer? Christmas Island, no specific locality (Coll. Andrews.)

Pannaria rubiginosa, Del? Christmas Island, no specific locality (Coll. Andrews.)

Pynine sorediata, Ach. Christmas Island, no specific locality (Coll. Andrews.)

Graphis, sp. Christmas Island (Ridley.)

Nephromium tomentosum, Nyl. Christmas Island (Ridley) a new record.

Thelotrema glaucescens, Nyl.

Flying Fish Cove, a new record.

FUNGI.

Identified by M. G. Massee.

Basidiomycetes.

Favolus albidus, Massee. A small white agaric luminous at night. Plateau at Irvine Hill.

Endemic, a new species.

Flammula sapinea, Fries. Pilens violet above, fulvous orange beneath; a new record.

Volvaria haplotricnia, Berk and Broom. A grey agaric. Flying Fish Cove, a new record.

Pleurotus promethius, Berk and Curt. A white fungus growing on dead wood; eaten by natives

Common on the Plateau, a new record.

Lentinus Lecontei, Fries.

Dark brown, Murray Hill track, centre of Island. A new record.

L. fulvus Berk, no special locality, a new record.

L. velutinus, Fries. ,,

Lenzites platyphyllus, Cooke. Common pale fawn above, white below. Waterfall, Phosphate Hill, a new record.

Schizophyllum commune, Fr.

A common grey fungus; Phosphate Hill etc., on dead timber. Common all over the world. Collected also by Andrews.

Polyporus confluens, Fr. No special locality; collected by Andrews.

P. subzonalis, Cook. Fawn colored.

Common Phosphate Hill, Murray Hill track, Flying Fish Cove. On dead wood, a new record.

Fomes lucidus, Fr.

Phosphate Hill, common, on dead wood. Also collected by Andrews.

Fomes australis, Fr.

Collected by Andrews and Lister.

Fomes conchatus, F. (Collected by Lister without special locality.)

Polystictus flabelliformis, Kl.

Common everywhere, Phosphate Hill; also collected by Andrews.

Polystictus occidentalis, Klotsch.

Velvety light brown. Phosphate Hill; a new record.

P. xanthopus, Fr.

Common Phosphate Hill, collected also by Andrews.

P. brunneo-pictus, Berk. A dark sepia brown fungus, Flying Fish Cove; a new record.

P. sanguineus, Fries. Common red fungus on old timber. Flying Fish Cove, also collected by Andrews.

P. luteo-olivaceus, B. and Br. no special locality, collected by Andrews.

Hexagonia palygramma, Mont. no special locality, collected by Andrews.

H. similis, Berk.

Phosphate Hill, Murray Hill road, new record.

Daedalea tenuis, Berk. No special locality, collected by Andrews.

D. subcongener, Berk. pale brown. Flying Fish Cove, a new record.

D. pavonia, Berk. ocreous brown with darker rings, Phosphate Hill, a new record.

Favolus tessulatus, Berk and Curt.
Light brown, Phosphate Hill, a new record.

F. boucheanus, Klotsch, no special locality collected by Andrews.

Laschia coespitosa, Berk. no special locality collected by Andrews.

Stereum lobatum, Fr. common. Phosphate Hill collected also by Lister.

Hydnum concrescens, Fries, no special locality, a new record.

Lachnocladium furcellatum, Sw. no special locality a new record.

Xylaria digitata, Fr. Black. Flying Fish Cove, a new record.

X. fistulosa, Lev. Black. Phosphate Hill, a new record.

X. hypoxylon, Grer. Black. Flying Fish Cove, Murray Hill Track, a new record.

Hirneola polytricha, Mont. Common used as food by natives. Flying Fish Cove, Plateau; a new record.

H. auriculæ—Judae, Berk, no special locality, collected by Andrews.

Guepinia sparassoides, Kalchbr (collected by Andrews.)

G. spathularia, Fr. no special locality, a new record.

Poria chlorina, Massee. a new species; a yellow crustaceous fungus on dead wood, Flying Fish Cove, not rare.

Rhopalopsis heliscus, Mont. on dead wood, black. Irvine Hall, a new record.

Daldinia concentrica, Cesati. Common everywhere on dead wood, Phosphate Hill, Steep point etc., a new record.

GASTEROMYCES.

Cyathus montagnei, Tul. no special locality, collected by Andrews.

Geaster Andrewsi, Blackm. Endemic, collected by Andrews.

Lycoperdon hiemale, Bull. A large fawn colored puff ball. Smith Point, a new record.

L. piriforme, L. Small brown puff balls on rotten wood, Smith point, a new record.

ASCOMYCETEES.

Trichoscypha tricholoma, Mont. no special locality, coll. Andrews

HYPHOMYCETES.

Stilbum javanicum, no special locality, coll. Andrews.

MYCETOZOA.

Stemonitis splendens var *genuina*, common Flying Fish Cove and Phosphate Hill (Andrews) Plateau.

Arcyria flava, Pers. no special locality, coll. Andrews.

Lycogala miniatum, Pers. no special locality, coll. Andrews.

ALGAE.

No algae have previously been collected on the Island.

Bangia ciliaris, Carm. Hook. Brit. Flora. II. 316 subspecies *disparsa*.

No. 231.

Halymeniapolyclada, A and E.S Gepp n. sp.
Flying Fish Cove (231 on rocks at the West End.)

Gracilaria corticata, J. Ag. Sp. Alg. Waterfall Cove.

Caralliua, sp. Waterfall Cove.

Jania micrarthrodia, Lam. Polyp. Flex. p. 271.
No. 235.

Rhodophyllia peltata. Grun. Alg. Tidschr. p. 34.

Ceramium clavulatum, Ag.
Cove near the Waterfall.

Hypnea pannosa, J. Ag. Liebm, p. 14.
Waterfall Cove.

Bostrychia tenella, J. Ag. Sp. Alg. II. p. 3.
In the mouth of the blowhole on the cliff a mile beyond the Waterfall.

Ectocarpus spongiosus, Dickie Journ. Lam. Soc. XIV. p. 191.
Cove near the Waterfall.

Dictyota dichotoma, Lam. Desv. Journ. de Bot. 1809, p. 42.

Padina Commersonii, Bory. Voy. Coquille 41.
Common, Flying Fish Cove.

Turbinaria ornata, J. Ag. Sp. Alg. I. 266.
Very common, covering the rocks all round the coast.

Sargassum Wightii. Grev. J. Ag. Sp. Alg. I 329.
Cove near Waterfall on rocks.

Avrainvillea lacerata, J. Ag. Till. Alg. Syst. VIII. p. 54.
Common, Flying Fish Cove and Waterfall Cove.

Chnoospora fastigiata, J. Ag. Alg. Lichm.
Cove near Waterfall.

Ulva Lactuca, L. Flying Fish Cove.

Cladophora repens, Har. Phycol. Brit. t 236.
Flying Fish Cove, Cove near Waterfall.

Caulerpa peltata, Lam. Journ. de Bot. 1809 p. 145.
Waterfall Cove.

Choetomorpha javanica, Kuetz. Sp. Alg. p. 376.
Flying Fish Cove.

Enteromorpha compressa, Grev. Alg. Brit. p. 180.
Flying Fish Cove.

Siphonocladus Zollingeri, Born. Journ. de Bot. 1887, p. 56.
Flying Fish Cove.

Dissemination of the Plants of Christmas Island.

Christmas Island as far as there is any reason to believe is a true Oceanic Island, that is to say, it has never at any time been connected with the mainland of Java or with any other land. Its geology was carefully studied by Andrews and is described in the Monograph of Christmas Island. He shews it to be an extinct volcano covered with coral reefs of various ages from the eocene period to the present day. This being so it follows that the indigenous plants reached the island by means which enabled them to cross the sea either by their seeds being drifted by sea-currents, or blown there by the wind, or carried by birds or bats.

It is probable that some part of the island was above water, and capable of maintaining terrestrial plants in Miocene times so that some of the plants may have established themselves as early as that period, but no fossil plants have yet been obtained there, nor are we yet acquainted with the Miocene flora of the neighbouring countries, so as to be able to suggest which of the plants if any belong to that date.

For the purposes of this paper I have classified the plants found in the various islands which are considered to have been always isolated from the mainland according to the methods by which their seeds or fruits can be disseminated and conveyed across a large tract of sea.

In this way plants may be divided into seven classes, viz. 1. *Sea-borne.* 2. *Bird or bat-borne*, by the seeds being swallowed by these animals and eventually deposited uninjured. 3. *Adhesive* (the seeds or fruits being attached to their fur or feathers and so conveyed). 4. *Plumed* seed. 5. *Winged* seed or fruit. 6. *Powder* seed; these last three being conveyed by gales of wind: and 7. *Weeds*, plants dispersed accidentally or more or less intentionally by man. There are some other methods of dissemination on land which cannot come into play in populating islands, such as dispersal by terrestrial animals, and insects, and by streams or rivers, and these may be neglected though they may act in dispersing a plant (the seeds of which have once been successfully landed) over the remainder of the island.

There are a certain number of plants often widely distributed which are certainly disseminated by one of these seven methods, but by which is at present doubtful. Such for instance are the herbaceous *Malvaceae* and many grasses and sedges, and again there are some plants which may reach these islands in more ways than one. *Portulaca obracea* may be an example of this. In some cases it appears to have been accidentally introduced as a weed, while in others it apparently came by sea. In this paper I class it as Sea-borne.

The weeds of human introduction have been already discussed. It remains to deal with the six other classes. (1) *Sea-borne* seeds or fruits. The larger Sea-borne seeds or fruits are tolerably well known for the most part. They have often some adaptation or modification for protection from the action of the sea water, as in the case of the strongly developed bladder-like calyx of *Hernandia* which protects the seed enclosed in it from the action of the salt water, and also aids to float it, and the corky outer coat of the seed of *Carapa*.

But many of the seeds often sea-dispersed have no more protection than the hard seed-coat. Such are the beans *Canavalia*, *Erythrina*, *Strongylodon*, *Entada*, *Guilandina* etc. It is essential of course that these seeds should float uninjured and it is necessary also that the plant should be able to grow on the sea shore when it arrives; so that the greater number of Sea-borne plants are always to be found on the shores or close to the sea. But there are some, such as *Terminalia Catappa* and *Eugenia grandis* which also can grow for some way at least inland, and their fruits are carried by bats or birds to some distance from the sea, whence they originally landed. Probably a good many plants travel by sea occasionally and arrive in safety at distant islands which one would not imagine to be able to travel so. I have seen plants of *Dendrobium crumenatum* a widely distributed plant floating apparently quite uninjured by sea water in the Banka Strait far from land, and I have been informed by Mr. Ross, that a clump of sugarcane had once drifted up upon Cocos Island where it began to grow and was eventually propagated. Many small seeded plants which commonly occur on sea beaches and shores are almost certainly sea dispersed, but owing to the smallness of their seed they have not been detected in sea drift, and thus one may be uncertain about them. A good deal more information is wanted on this head.

As to the direction of sea-currents in these seas, I have but little information but I may remark that we found plenty of pumice-stone in the eastern corner of Flying Fish Cove and this had doubtless come from Krakatau, which is west of Christmas Island, and in 1890 I saw, in going from the Sunda Straits to Cocos and Christmas Islands, much of this pumice floating in large patches. The pumice also occurred some years ago in quantity on the point known as Tanjong Gol in the extreme south west of Singapore. So that currents capable of carrying pumice-stone run both east and west from Krakatau. Seeds therefore of plants could be brought to Christmas Island at least from Java and Sumatra without requiring to be drifted to Australia and back. Andrews points out that the Ocean current which passes the island is the equatorial drift which comes down from the Timor sea and receives tributaries through the Straits between Bali and Lombok etc. This would bring down doubtless all the Sea-borne seeds of Australian types on the island. But there must be also currents from the north to account for the typically Javanese plants.

The absence of many plants of which the seeds must at times have reached the island is perhaps due to the unsuitability of soil for them. Thus the Mangrove plants, *Rhizophora*, *Bruguiera* and *Avicennia* the fruit of which may be seen in abundance drifting down the Banka Straits are absent, *Cerbera odollam* too seems to have failed to properly establish itself though a tree of this was seen by Andrews. It seems to have disappeared since. There is in fact no suitable ground for these plants which require a muddy soil for their existence. *Pangium edule* a riverbank plant, the seeds of which have been seen in sea drift in other parts of the Archipelago besides Christmas Island where I found one battered seed, has not succeeded in establishing itself as there is no place suited for it.

Some of the plants which have established themselves are very local and only growing special soils, such are *Mariscus albescens*, on the out crop of volcanic rock near the Waterfall, and *Nephrodium truncatum* on the mud by the fresh-water stream in the same locality, both evidently plants which cannot grow on the coral reefs or their detritus.

The great height of the cliffs surrounding the island for its greatest part would also militate against the successful landing of sea-drifted seeds. There are as far as is known only two or three possible landing places for such plants, Flying Fish Cove, the Waterfall bay and a few smaller beaches beyond, the West white beach and a few other possible spots, but in former years there may have been other suitable spots, and during the Monsoon the waves beat up very high on parts of the coast, and seed might be thrown to the top of many of the lower cliffs.

During my stay in Christmas Island I looked for fruits and seeds washed ashore in the bays but could find very few.

During the heavy storms there might be more. All I could find were *Terminalia Catappa*, *Guettarda speciosa*, (sunk) and the remains of a seed of *Pangium edule*. Portion of a rhizome of a bamboo, long dead however, was found in a bay near the Waterfall. No bamboos are grown on the island. Mr. Chapman however after my departure at my request kindly sought for seeds etc., after heavy storms, and obtained seed of *Cerbera odollam*, *Terminalia*, *Entada scandens*, *Pandanus*, and fruits of *Bruguiera* dead and nibbled by molluscs, and carrying barnacles. Also he found many large bamboos with shoots but dead on the West white beach.

The following is the list of plants probably introduced by sea-currents to Christmas Island.

Portulaca oleracea.
Ochrocarpus ovalifolius.
Calophyllum inophyllum.
Malvastrum tricuspidatum. Probably.
Sida spinosa. Probably.
Abutilon auritum. Probably.
A Listeri. Probably.
Hibiscus vitifolius. Probably.
H. tiliaceus. Common sea drifted plant.
Colubrina pedunculata.
Erythrina indica.
Strongylodon ruber.
Galactia tenuiflora.
Canavalia. Common in sea drift.
Pouqamia glabra.
Inocarpus edulis.
Gudandina bonducella. Well known as a sea drift seed.
Entada scandens. Well known as a sea drift seed.
Terminalia Catappa. Well known as a sea drift seed.
Combretum acuminatum.
Quisqualis indica.
Gyrocarpus asiatica.
Bvrringtonia rubra.
Pemphis acidula.
Sesuvium portulacastrum.

Guettarda speciosa.
Morinda citrifolia.
Wedelia biflora.
Scoevola Koenigii.
Cerbera Odollam.
Ochrasia Ackeringoe.
Tournefortia argentea.
Cordia subcordata.
Ipomea pes-caprae.
I. *grandiflora.*
Possibly also *I. peltata, digitata* and *Campanulata.*
Convolvalus parviflorus.
Asystasia alba?
Boerhaavia. The fruits however are adhesive and may have been brought by birds.
Hernandia peltata.
Euphorbia atoto.
Croton caudatus.
Crinum asiaticum.
Pandani.
Mariscus albescens.
Finbristylis cymosa.
Lepturus repens.
Ischoemum foliosum?
Cycasiciscinalis.

Some years ago a number of seeds drifted up in Cocos Island were sent me by Mr. Ross. They included.

Mucuna sp.
Cynometra. Pods containing seed.
Entada scandens.
Strongylodon ruber.
Guilandina bonduc.
Garcinia mangostana fruit.
Carapa moluccana.
Hodgsonia heteroclita.
Ochrocarpus ovallifolius.
Pangium edule.
Heritiera littoralis.
Terminatra catappa.

Aleurites moluccanus.
Quercus 2 species.
Erythrina probably *indica.*
Canavalia lineata.
Barringtonia 2 species?

and several other indeterminable seeds. Most of these were in good condition, and would probably have readily germinated but of all, only two species are established on the island, viz. *Guilandina bonduc,* and *Aleurites moluccanus.* Mr. A. S. Keating in Holmans travels quoted by Mr. Hemsley (Voy. H. M. S. Challenger Botany of South Eastern Moluccas p. 114) records also the "Soap-tree" (probably *Sapindus*) Castor-oil (*Ricinus communis*), and timber from Java and Australia and suggests that the seeds were first drifted to the Australian coasts by the North-West monsoon and then back again by the South-East trade wind. In view of the fact that there are no plants on the island nor seeds in these lists at all characteristic of Australia, and the abundance of specimens of almost all kinds mentioned in Mr. Ross' collection and the absence of the Australian and Polynesian forms occurring in Christmas Island, viz *Inocarpus edulis, Ischoemum foliosum* and *Finbristylis cymosa* (represented in Cocos by the Malayan *F. glomerata,*) I should doubt this very much, in spite of the trees of blue gum wood of Australia said to have drifted there.

All the plants recorded from Cocos Island in Forbes' list (introduced plants excepted) occur in Christmas Island, except *Triumfetta procumbens, Guilandina Bonduc* (replaced by *G. Bonducella, Ochrosia parviflora* (represented by *O. Ackeringae*) *Dicliptera Burmanui,* (*D. macleari* in Christmas) *Fleurya aestuans* (*Urera Gandichandiana*) represented by *Fl. ruderalis* Gaud. *Stenotaphrum lepturoide* (said to be identical with *S. americanum* by Hemsley) and *Finbristylis glomeratus.*

There are however in Christmas Island three noticeable plants of Australian and Polynesian origin only, *Inocarpus edulis, Ischoemum foliosum* and *Finbristylis cymosa.* These it is most probable arrived by sea at Christmas Island. It would indeed be unlikely for any bird except sea birds to fly successfully for that distance, nor is it probable that even plumed seed would be drifted by wind from Australia to Christmas Island.

2. *Bird and bat-borne seed and fruit.* By this class of seed I mean those that are carried about by birds or fruit-bats swallowing the fruit or seeds and afterwards passing the seed in their excreta. Fruits and seeds dispersed by adhering to fur or feathers are classed separately for they may be dispersed by sea birds only, while this class require the aid of frugivorous birds.

Most of the seeds borne by birds and bats internally are enclosed in fleshy drupes, berries, and figs, but it is certain also that a number of seeds of small hard seeds or fruits such as those of the capsular *Euphorbiaceæ* are also swallowed by birds and passed unharmed, though it is hard to see why a hard dry seed such as those of *Macaranga*, and *Sapium sceleratum* (a plant thus dispersed by birds in Fernando de Noronha) should be attractive to birds. Possibly also some of the fruits of the *Cypecraeæ* and grasses found in Oceanic Islands have been brought there by birds.

Fruit-bats though fond of large-sized drupes do not usually at least swallow them but flying to a neighbouring tree nibble off the flesh and drop the stone on the spot. They however eat figs greedily, swallowing the whole fruit.

Christmas Island possesses at present as residents the following frugivorous birds and mammal. A fruitbat, two pigeons, *Carpophaga whartoni* and *Chalcophaps natalis*, the white-eye *Zosterops natalis* and an occasional fruit or seed-eater *Merula erythropleura.* All are endemic, but the *Chalcophaps* is hardly distinct from the common Malay one. The white pigeon *Myristicivora* has been seen on the island, blown over in heavy gales, and a minah (*Acridotheres*) was shot on the island during our visit but may possibly have been brought over by a native. How many more birds have been driven on to the island by the heavy gales and either perished or managed to fly back again no one can say. Many waders, as well as wagtails and a duck seem to come over regularly from Java.

In the commencement of the afforestation of an Oceanic Island, it is obvious that the first terrestrial birds who bring the seeds of such fruit as they eat must perish of starvation or less probably fly on to other places where they can get food. It is only when food has become plentiful by the growth of the seeds birds have brought that the frugivorous birds can settle down in an island.

In Cocos Island there seem to be no frugivorous birds, nor can the *Pteropus* occasionally finding its way there survive its voyage. (Forbes wanderings p. 32). Pteropus however can subsist very well on shoots of trees as well as fruits.

In Cocos Island there are no fruits suitable for frugivorous birds except those of a few introduced plants so that birds requiring food of this nature would hardly be likely to survive a long voyage to the island.

I made some experiments in the Botanic Gardens in Singapore with fruit-eating birds, to discover if possible how long they retained the seed of fruits they had swallowed before passing them.

A Cassowary was fed with fruits of the Cocoplum (*Chrysobalanus Icaco*) at 9.20 a.m. and passed the seed after 8 p.m. but before morning.

A Hornbill fed with Cocoplum passed the seed at the same time as the Cassowary. It ate berries of *Rhodamnia trinervia* at 10 a.m. and passed some of the seed at 12, and the rest at 2 p.m. It ate fruits of *Carissa carandas* at 7 a.m. and passed some at 8 a.m. the rest at 1 p.m.

Myristicivora, the white pigeon known as the Rawai was unable to swallow seed of the Cocoplum or that of the Rambutan, *Nephelium lappaceum.* It ate *Rhodamnia* fruits at 10 a.m. and passed all the seed at once at 1 p.m. It ate fruits of *Pinanga kuhlii* at 8.30 a.m. and began to passs them at 10 a.m. continuing till it passed the last at 4 p.m. Carissa fruits, it swallowed at 7 and passed the seed at 8 a.m and 1 p.m. as did the Hornbill.

It was observed that when fed with much fruit, and these birds passed the seed more slowly than when they had but little given them.

Betel nuts with the husk on were swallowed by the hornbill but it vomited up the seed. Naturally this fruit is not eaten by any animal so far as I am aware. Rambutans (*Nephelium*) it only pecked and sucked not swallowing the seed.

It would appear from these observations that these birds would only carry the seed for a distance which could be covered by them in 8 hours or a little more, so that in conveying seeds from say Java to Christmas Island about 300 miles the birds must make the passage in a comparatively few hours.

Bird and Bat-borne seeds.

Limacia nativitatis.
Pittosparum nativitais, fruits of *P. ferruginens* in Singapore commonly so carried.
Grewia two species.
Acronychia Andrewsii, Fruits, pink berries.
Dysoxylon amooroides, Seed swallowed by birds.
Celastrus paniculatus?
Vitis repens.
V. pedatus, Berries pink.
Lea sambucina.
Allophyllus Cabbe, Berry red.
Eugenia, Drupe small red.
Zehneria, Berry small pink.
Heptopleurum.
Randia densiflora, Drupe small red.
Ardisia pulchra, Drupe small.
Sideroxylon sundaicum, Favourite food of *Carpophaga.*
Ehretia buxifolia ?
Solanum biflorum, Berry red.
Physalis minima.
Datura alba, From the way *D. fastuosa* spreads in Singapore I believe it is the dispersed by birds, though its dry and indeed poisonous seed does not seem inviting.
Callicarpa longifolia, Drupe white small.
Premna lucidula, Drupe white small.
Deeringia celosioides, Drupes red.

Cryptocarya nativitatis, Favourite food of *Carpophaga.*
Claoxylon caerulescens.
Macaranga tanarius ?
Celtis cinnamonea.
Trema amboinensis, Drupes orange, commonly dispersed by birds in Singapore.
Ficus retusa, Eaten by bats and birds.
F. saxophila, Figs bright red or orange.
Laporteas ?
Boehmeria platyphylla ?
Arenga Listeri, Berry pink.
Spondias dulcis may have been sea-drifted to the Island as fruits of one species have been found in sea-drift in Jamaica, but it is stated that it is commonly carried about by Hornbills in Java, and as these are far-flighted birds one or more may have reached Christmas Island at some period. The fruit appears to be too big for *Carpophaga*, as it remained untouched at the foot of the trees, and the trees were confined to a limited area.

It is perhaps worth noting that all these plants in this list are either Javanese or from one of the neighbouring islands or allied to plants from this region, with the exception of *Cryptocarya nativitatis* of Australian affinities.

ADHESIVE SEEDS OR FRUITS.

These are furnished with hooks, bristles, or hair, or a gummy secretion by which they adhere to the fur or feathers of birds and animals and are so borne from place to place. This class of seeds is rare in Oceanic Islands, the greater number of the plants possessing such means of dissemination being low growing plants, with which birds seldom come in contact. Such are *Centotheca* and *Laphotherum* grasses dispersed by mammals walking through the forests. These plants through common and widely dispersed through the Malay region are absent from the

Island. Several of the weeds are dispersed by their adhesive fruits such as *Synedrella* and *Paspalum conjugatum* but these evidently did not reach Christmas Island without the aid of human beings and are not yet to be found in any parts of the island which is not constantly visited by man.

The following list contains all the plants exclusive of weeds which seem to have reached Christmas Island by adhering to the feathers of birds.

Triumfetta suffruticosa, A shrub with capsules covered with hooked bristles very adhesive. Probably brought by sea-birds, as it was abundant in two places where the birds nested.

Dicliptera Macleari. Low herb, adheres by its spiny bracts.

Anisomeles ovata, perhaps adheres by its spiny calyx.

Leucas, adheres by its spiny calyx.

Boerhaavia, fruits glutinous and sticky may be sea borne, but I found it not only on the sea shore but on high cliffs above Flying Fish bay, where it is hardly likely to have been thrown by the sea.

Pisonia grandis, and *P. excelsa*, Fruits when ripe split and exude a glutinous matter very adhesive. Forbes mentions (Naturalist's wanderings pp. 30, 33) how he found a *Pisonia* in Cocos the fruits of which adhered to the feathers of the herons, and often killed them by clogging their feathers. One of these herons was *Demiegretta sacra*, not rare in Christmas Island. Many sea birds nested in the trees of *Pisonia grandis*, but I did not find any fruits of this species so that I am not sure whether they are as adhesive as those of *P. excelsa*.

Achyranthes aspera has spiny burrs which are adhesive, and is commonly to be found on the cliff edges near the boody's nesting places.

All these plants are either Javanese or have Javanese affinities except *Pisonia grandis*, a native of Australia and Polynesia.

Plumed seed and fruits.

These are chiefly of plants belonging to the orders *Apocynaceae*, *Asclepiadeae*, *Compositae*, with a few *Gesneraceae*, and grasses. The seed or fruit are disseminated by wind, and it might be thought that these would readily be conveyed to Oceanic Islands, as are the dust seed plants. This is not the case. They are comparatively scarce, and curiously most of the *Compositae* of Oceanic Islands are the ones which have plumeless fruits, introduced weeds excepted. Only 3 plants with distinctly plumed fruits or seeds are known from Christmas Island, of these one *Ageratum conyzoides* is certainly a weed. The others are *Blumea spectabilis* and *Hoya Aldrichi*. The former is a hill forest plant of the Malay region, the latter an endemic species allied to Javanese species.

Winged fruit and seeds.

These are still rarer than the plumed seeds, and of the very few that are to be met with in Oceanic Islands, it may be doubted very much whether their wings have played a large if any part in their dissemination. The *Dipterocarpæ* for instance are quite absent from Oceanic Islands. *Gyrocarpus* which occurs in Christmas Islands and other Islands a sea shore plant is certainly disseminated by its wings, but I suspect it reaches the islands by sea. I cannot conceive of the winged fruits of *Berria* being drifted by the severest gale for two hundred miles, as it is really hardly adapted for flying more than about 40 yards, yet it occurs on Christmas Island. The fruit is a winged capsule which splits when ripe and releases its pubescent seed, so that really ripe fruit if blown out to sea in a gale of wind, would almost certainly break up ere it had gone far and the seed would fall into the sea.

Dust seed.

The very fine dust like seed of orchids, and *Balanophara* and the spores of ferns, Lycopods and cellular plants have perhaps the widest and most rapid dissemination of any group and there can be no doubt that they are the first seeds to arrive at an Island when it first becomes in a fit state to receive terrestrial vegetation, but there are islands in which plants with this class of seed are scanty, notably Fernando de Noronha on which I found no orchids, only one fern and very few cellular plants. The reasons for this seemed to be that the neighbouring land from which the wind could bring seed was somewhat of a desert nature, and ferns at least were not very common, also the island itself was distinctly xerophilous with a very dry season during which no rain fell and the ground became very dry. In Cocos Island also dust—seed plants are very scarce no orchids or ferns, and only one moss and one fungus being recorded. Here again it is doubtless the unsuitability of soil and climate that prevents these plants from establishing themselves. In Christmas Island indeed that though the number of ferns is large, the ground and rocks were in the dry season so arid that a considerable area produced no ferns or mosses. Where the ground was damper in the forests of the plateau, ferns and mosses were plentiful. One fern was confined to the fresh water stream never dry at the Waterfall, and mosses and fungi were commoner round the water tanks where water was often spilt.

Cellular plants, algæ and fungi, have an extremely wide dispersal area, far more so than the more elaborate vascular plants, and a good many seem to occur in all corners of the world. Some of the fungi, such as *Polyporus sanguineus*, *Guepinia*, *Schizophyllum commume* which are common on old timber may easily have been brought on pieces of wood by ships stopping at the island but most at least of the fungi must have arrived by the drifting of their spores by the wind. Considering the dryness of the weather a large number were obtained and some more were seen which could not be preserved. There are probably very many more to be collected at more suitable seasons. Besides the cellular plants there occur of the dust—seed group, the following, one *Balanophora*, ten orchids, 21 ferns two *Lycopadiaceae*. Of these 34 plants 17 are epiphytic plants, 7 orchids, and 10 ferns, the rest are small low-growing terrestrial plants. All are either Javanese or closely allied to Javanese species, but two; *Balanophora insularis* and *Dendrocolla carinatifolia* have hitherto been only met with in the island of Pulau Aur off the East coast of the Malay Peninsula. Balanophoras of this type however occur in Tahiti, Salayer Island, Timor Laut, and the Comoro Islands. They seem to be all insular and to occur only in the Southern Islands in a line fringing the South of Asia and reaching to Tahiti and Comoro respectively. The endemic species of dust seed plants are 6 orchids and two ferns.

Besides these there are a large number of cellular Cryptogams, most if not all brought to the island by the drifting of their seeds in the wind. Two species of *Peperomia* also occur the very small fruits of which may possibly have been blown by the wind to Christmas Island.

I have assumed that the epiphytic orchids have all reached the island by their seeds, but it is quite possible that some of them have been sea drifted to the Island. For in 1890 I saw plants of *Dendrobium Crumenatum* apparently quite fresh and green floating about in the sea off the coast of Banka and Moseley (Notes by a Naturalist p. 368) mentions finding in Little Ki Island an epiphytic orchid washed up by the sea in a quite lively state. Most epiphytic orchids however are very quickly killed by sea water.

Malacca Lace.

By Mrs. Bland.

Fifty years ago really fine cotton pillow lace was made in Malacca. The lace was worn by the Chiefs and Hajis on their coats and trousers, and it may still be seen occasionally at weddings, but with the use of European clothing the lace has more or less disappeared. The present generation are content to use nine to nineteen bobbins, while their grandmothers and great aunts before them used fifty to one hundred, or even more. Moreover, they have lost all their patterns, all their fine bobbins and even their pillows. The white ants have consumed them all. Occasionally; one may come across a few relics of this past art in beautiful ivory bobbins and faded trouser borders. I myself obtained a very fine specimen of the latter from an old Malay, and have no doubt others can be picked up in the Kampongs (see plate No 3). All that remains of this old industry is the present "biku" making, chiefly found in the district of Pringgit, where quite fifty women use pillows—also atBukit Tempurong and Bukit China, but here in much fewer numbers--at the outside twenty workers. "Biku" or edging is made of coloured silk for native use to border handkerchiefs and veils, and is sold very cheaply for that purpose to Malays and Chinese. It is sold in lengths of 2½ yards or one "bimpul." The silk is bought by the woman in skeins from "kelontong kain" the travelling draper, or pedlar, and he also sells the "biku" itself with his other wares. The pillow used, as depicted in the photograph, (see plate 1) is of the simplest description—a rough wooden sloping stool padded with cloth and stuffed with sawdust. The cost is fifty or sixty cents at the present date. It is called "bantal" by the Malays, and I have noticed the little girls sitting astride their pillows when just commencing a new piece. It is perhaps to this reason that the pillow owes its shape—it no doubt suits the Malay who always works sitting on the floor,—but it is very back-breaking to the European. Formerly the pillows always had a drawer for holding extra bobbins. It is now omitted. The bobbins are either made of wood, horn, or ivory, and are called "buah." They are very similar in shape to the Ceylon bobbins, but rather more delicate in make and size. At the present time, there is considerable difficulty in getting bobbins made at all and the old bobbins made in ebony and ivory for three or five cents, cannot now be obtained in plain wood for less than eight or ten cents. There are five patterns now in common use, the greatest number of bobbins used being nineteen. Four of these patterns are depicted in plate 2, requiring nine, eleven, fifteen, and nineteen bobbins respectively beginning at the foot of the plate. There is one other pattern not shown requiring thirteen bobbins. The two insertions shown at the top of plate 2 are old patterns not now made. Fifty and thirty bobbins were used respectively in their composition. The patterns are pricked out in paper and called "Sepesel" and "achuwan." The (Malays have names for their patterns such as :—

1) "Prut Lintah" or leech's stomach. This in "torchon" would be called "bar" stitch—In the insertions shewn in Plate 2, these bars are combined to form 6-pointed stars, which are known as "Bunga Tanjong":—

(2) "Anyam Krosi" or chair-plait which in "torchon" would be called cloth stitch, is also shown in the same insertions alternating with the "Bunga Tanjong."

(3) "Siku Kĕluwang" or bat's wing, which is a vandyke pattern depicted in the wide insertions of the old trouser border in plate 3. And I daresay many others which are now forgotten with the art. The various stitches are also named, and one "biku" of thirteen bobbins was thus described to me, beginning at thefoot of the edging right across to the top :—

"Puchok" or "Kipas" taking one bobbin.
"Buah Sirih" taking two bobbins

"Ikatan kipas" taking two bobbins.
"Penyambut" taking two bobbins.
"Prut Lintah" taking two bobbins.
"Tali Ayer" taking two bobbins."
"Kaki" taking two bobbins.

The most common stitch in all their laces is the "Ikatan," or fastening stitch. It does not resemble the torchon "half stitch" or "whole stitch" but seems to be original. A more elaborate form of it is called "Mata Punai," and is the only stitch which has the same name as in the Palembang patterns sent to me. The Malacca Malays use the word "renda" for all lace except the narrow edgings which they call "biku." They themselves never seem to have made wide edgings; all their wide laces being insertions joined together for trouser borders. They throw their bobbins across with incredible rapidity using their second and third fingers to flick the bobbin across more especially in making the "bars" or "prut lintah." It is an art which cannot be acquired by everyone. As to the origin and history of the industry I have been unable to find out anything. Through the kindness and courtesy of Mr. Spakler, Consul General for the Netherlands in Singapore, I have obtained a pillow from Palembang, Sumatra, where lace is also made by the Malays. This pillow is identical with the Malacca one in structure and design only with a drawer and more elaborately ornamented. The industry is a flourishing one in Palembang where the Dutch ladies buy the lace in quantities for their Kĕbayas (jackets) and it is sold in lengths of 4½ yards for this purpose. The bobbins are also identical, though slightly longer and up to one hundred are employed. What is more interesting the common terms are the same—"Bantal," "Buah," "Sepesel"—but in addition they have the word "Papan" for insertion, and "renda" is confined to wide (2), edgings which in Palembang are also made by the natives. "Renda" is I believe, a Portuguese word and is also used in Ceylon for lace, were I am told the lace industry was undoubtedly founded by the Portuguese. But again it may be native. If is impossible now to say. A very curious pillow was shown to me by Mr.

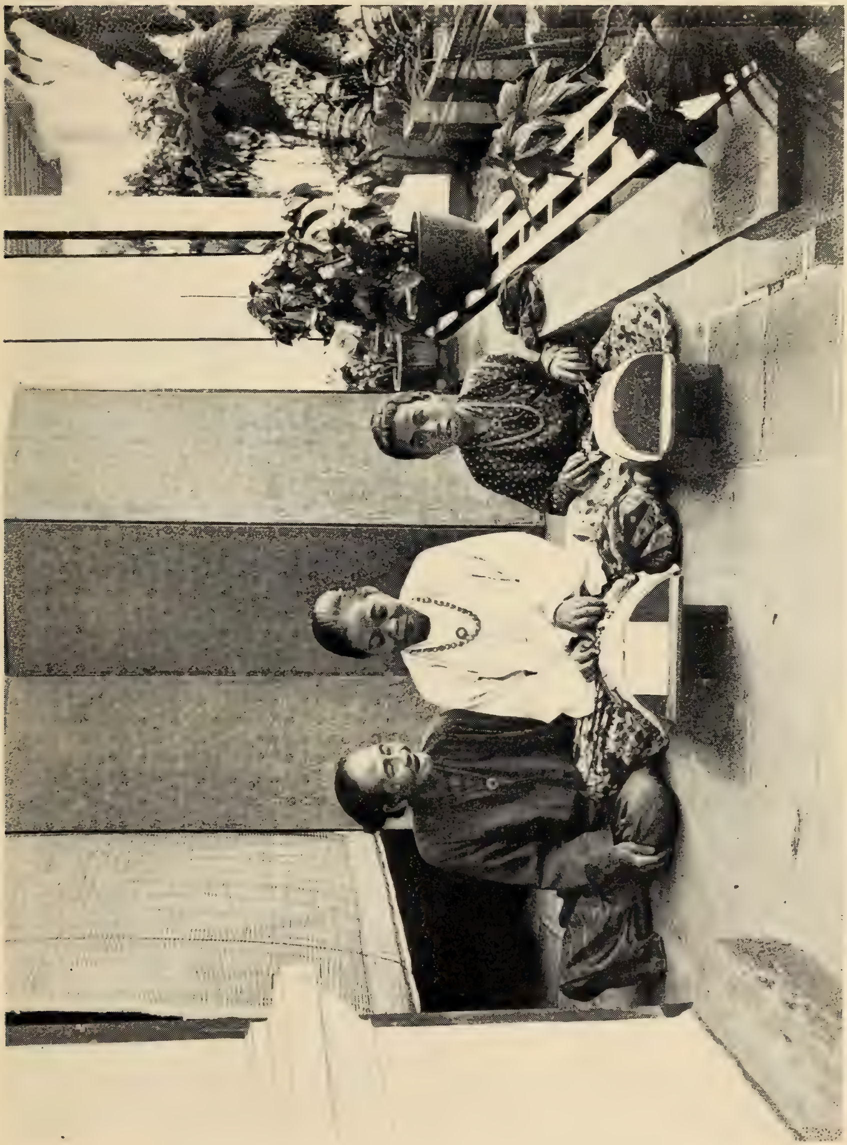
R. Shelford, Curator of the Sarawak Museum at Kuching, on which edgings are made by the Malays principally in gold thread for veils and coats worn by the Dyak women. This edging is there called "puntas," the pillow "guling puntas," the bobbins "pelulak," and the pattern which is pricked out on a strip of palm leaf is called "kabat puntas." The pillow is very primitive, a cylindrical cushion, placed on an earthenware bowl, and the bobbins which vary in number from four to sixteen are like ninepins and extremely clumsy. Good specimens of all the three pillows here described may now be seen in the Singapore Museum. I have learnt myself to make the Malacca "biku" and have appended to these notes the common words used by my teacher during our lessons. A tentative attempt is now being made to revive the industry at the Girls' School at Pringgit. It is an industry specially adapted to Malay women. I owe my grateful thanks to the Bible Society Ladies for introducing me to this local industry, also to Mr. Howell, who has so kindly assisted me with his camera, and for some very careful and detailed information received from the Resident in Palembang through Mr. Spakler.

Terms.

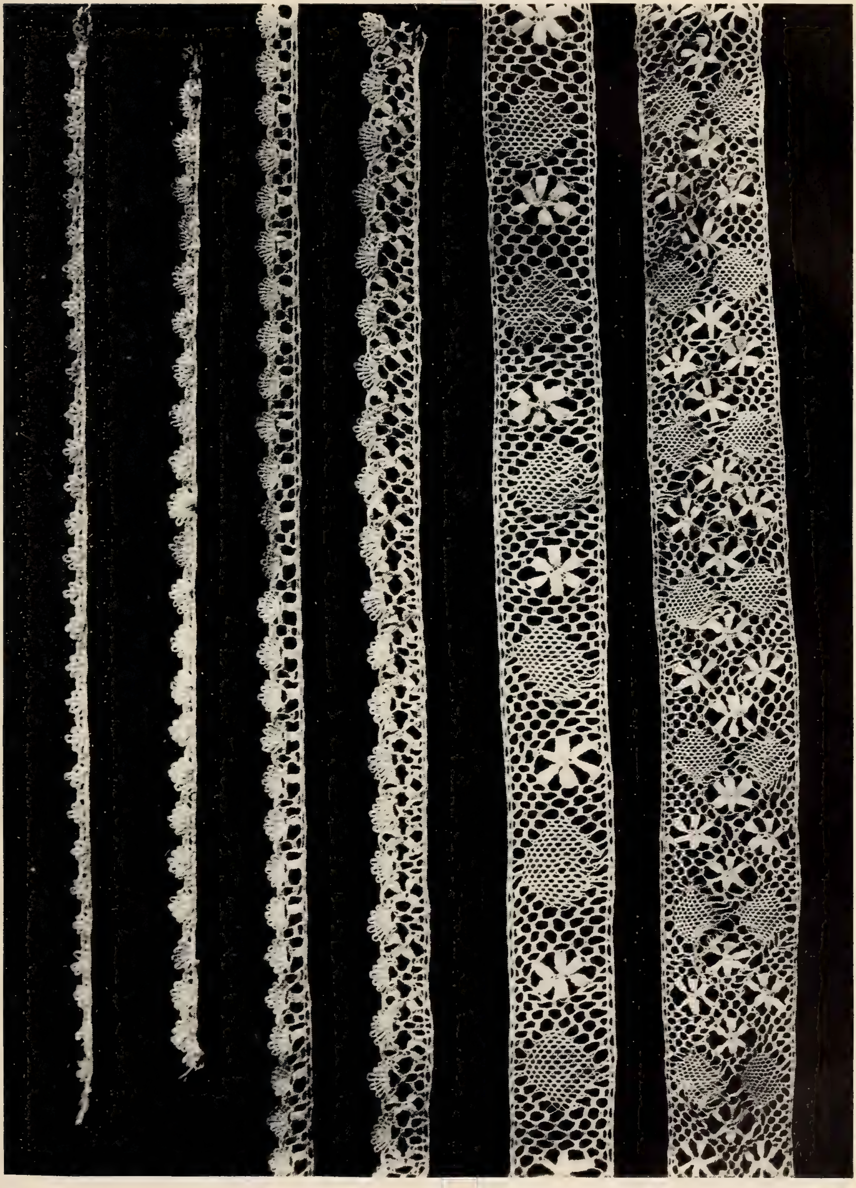
"Kuku"	finger nail, applied to loops in the "kipas"
"Kedut"	crumpled
"Ulor"	slack
"Tĕgang"	tight, taut
"Selang"	alternate
"Pintal"	to cross
"Kipas"	fan
"Rengkap"	pair, complete set of two
"Chuchok jarum"	put in pin
"Ikat Jarum"	to enclose pin
"Peniti"	pin
"Kwet"	flick given to the bobbin
"Unting"	skein
"Tukal"	bundle
"Chuchok sepesel"	to prick out the pattern

STRAITS BRANCH, ROYAL ASIATIC SOCIETY.

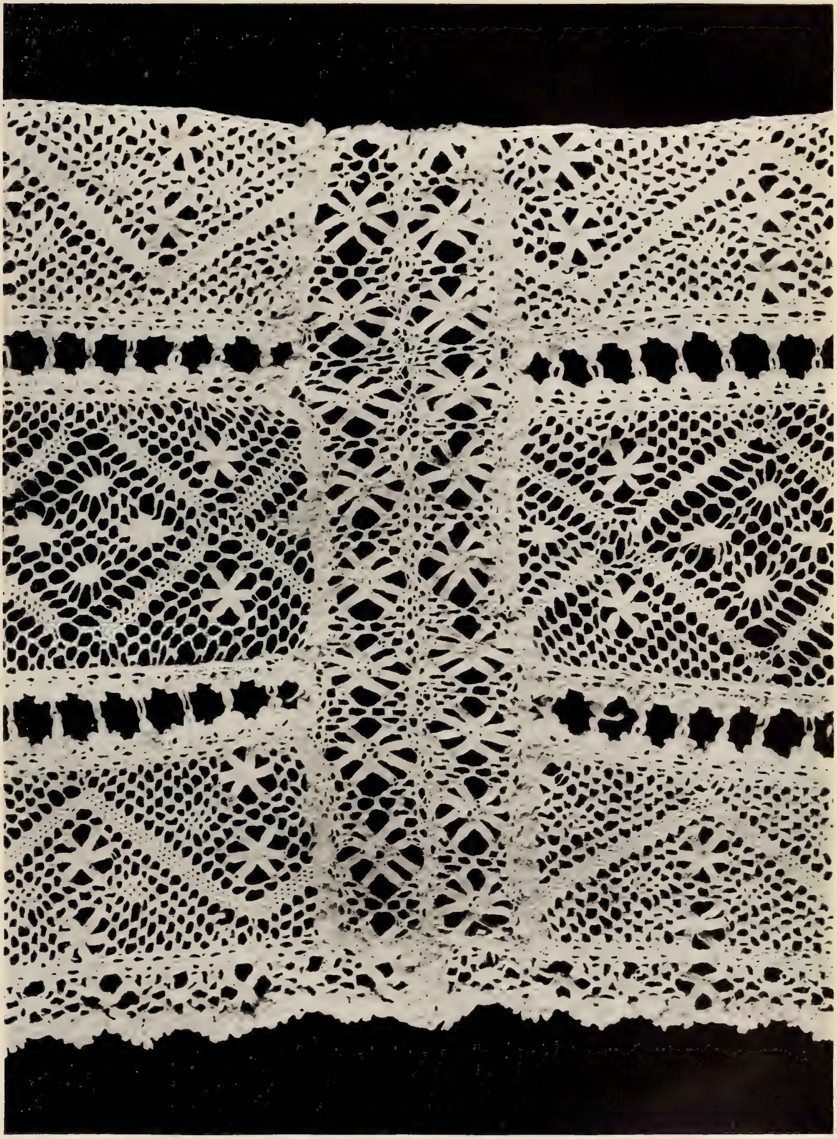
JOURNAL 46. PLATE I.



Lace Makers, Pringgit.



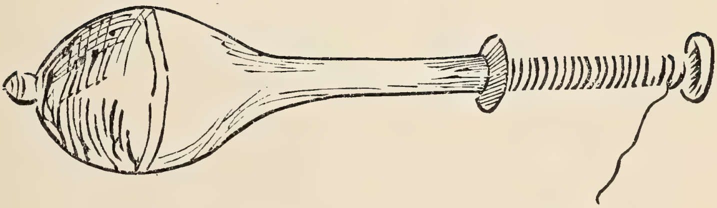
Evolution of lace pattern.



Trouser border.

STRAITS BRANCH, ROYAL ASIATIC SOCIETY.

JOURNAL 45. PLATE IV.



Malacca lace bobbin

EXPLANATIONS OF PLATES 1 TO 4.

Plate 1. Lace-makers from Pringgit, Malacca.

Plate 2. *a* to *d* show evolution of pattern in 4 strips of "biku."

- *a* 3 pointed fan (*kipas*) 9 bobbins employed.
- *b* 5 pointed fan, 11 bobbins employed.
- *c* 5 pointed fan and bar (*prut lintah*) 15 bobbins employed.
- *d* 5 pointed fan and bars forming a four-pointed star (*bunga tanjong*) 19 bobbins employed.
- *e* & *f* Two strips of insertions composed of cloth stitch diamonds (*anyam krosi*) alternating with six pointed stars (*bunga tanjong*). The ground work of *c* to *f* is composed of fastening stitches (*ikatan*).

Plate 3. Wide trouser border at least fifty years old. Pattern "siku kĕluwang" (bat's wing).

Plate 4. Malacca Lace bobbin.

Short Notes.

Note on the Wild Goat of the Malay Peninsula.

An adult male of *Nemorrhoedus sumatrensis* var *Swettenhami* was taken alive on the sea coast at Batu in the Kuala Langat district of Selangor last April (1905). The surrounding country is quite flat, the solitary granite hill of Jugra, the nearest high hill being some sixteen miles away. Wild goats have not been heard of on this hill. It may be that this goat was driven from the interior by some rival and wandered down to the coast. It was driven with the sea by the Penghulu's dogs and has since been in captivity, the animal is becoming quite tame.

HENRY NORMAN.

Habits of the Tupaia.

The common little Tupaia, (*T. ferruginea*) seems to be quite omnivorous in its habits. In the Journal No. XXIX *p.* 148, I mentioned that it ate considerable quantities of fruit, although it belongs to the order tinsectivora. Recently I saw one chasing a bull-frog (*Callula pulchra*) along a garden path. The frog puffed out as usual when alarmed and hopped along as fast as it could, the Tupaia trying to catch it by the leg. Another Tupaia ran out of the wood, and drove off the first one, and began to chase the frog, finally catching it in its mouth and darting away with it into the wood. The frog when alarmed exudes a very sticky liquid from its back, and apparently the Tupaias either could not or were unwilling to seize it by the back, and tried to catch it by the leg, but appeared to have some difficulty in so doing.

H. N. RIDLEY.

Some Birds of Tiuman Island.

C. Boden Kloss, F.Z.S., F.S.A.

Towards the end of a cruise in the Southern China Sea undertaken in 1899 (see journal 41), Dr W. L. Abbott and I spent about a week on the east coast of Tiuman collecting mammals and birds in the vicinity of Joara Bay, and again, a year later, on our return from an expedition to Tringanu, stopped for some days at Tingah Bay on the west side of the Island for the same purposes.

It was my intention to have given some account in the Journal of this little known Island and our experiences; but my notes have been mislaid and all that I have now to hand of the results are lists of the mammals and birds collected, of which I now record the latter here.

A word with regard to Tiuman. It is about 120 miles by sea from Singapore opposite the mouths of the Rumpin and Endau Rivers though the nearest point of the Malay Peninsula is distant about 22 miles S. E. It belongs to Pahang, and is inhabited by a few Malays of that race who collect rattan in its forests. The island is some eleven miles long N. S. and six wide at its broadest part and is very hilly, the highest peak being 3444 ft. while high above the southern shore are two peculiar bare rocky pinnacles known as the Dragons Ears to which reference has already been made in this journal and in the journal of the Indian Archipelago.

Various new species of mammals were obtained, but there were no novelties among the birds which were all collected below 500 feet alt. as during neither visit did we ascend the mountain. A number of species were observed in addition to those preserved but for the reason given above I am unable to include them here.

1 Malacopterum magnirostre, Moore.
2 Stachyris davisoni, Sharpe.
3 Cyanoderma erythropterum, Blyth.
4 Aegithina viridissima, Horsf.

5 Tricholestes criimger, Hay.
6 Pycnonotus simplex, Less.
7 Dissemurus platurus.
8 Orthotomus atrigularis, Gemm.
9 Acanthopneuste borealis, Blas.
10 Lanius superciliosus, Lath.
11 Graucalus sumatrensis, S. Müll.
12 Eulabes javanensis, Osbeck.
13 Cittacincla macrura, Gm.
14 Hirundo gutturalis, Scop.
15 H. javanica, Sparmm.
16 Motacilla flava, Linn. *var.* leucostriata.
17 Limonodromus indicus, Gm.
18 Anthrothreptes malaccensis, Scop.
19 Dicaeum cruentatum, Linn.
20 Alcedo bengalensis, Linn.
21 Collocalia inexpectata, Hume?
22 Rhamphococcyx erythrognathus, Hartl.
23 Carpophaga æenea, Linn.
24 Glareola orientalis Leach.
25 Totanus hypoleucus, Linn.
26 Ardea sumatrana, Raffles.
27 Lepterodius sacer, Gm.

A Johore Python.

In December 1904 I spent a few days on the summit of Gunong Pulai accompanied by Mr. H. N. Ridley. When we reached the *Kangka* at the foot of the mountain one of my collectors, whom I had sent on in advance, informed me that an *ular sawa, 5 depas* in length, had been killed by the Chinese there a few days before. The skin was nailed out along several boards but was unfortunately without the head which the Chinese had chopped off in slaughtering the reptile. We measured the portion that remained however and found it to be 29ft. 10 inches in length so I have no doubt that the dimensions given by my collector of the snake in the flesh were correct. This python had entered a pig-sty in the evening and there made a meal of a gravid sow, for when it was skinned next day it was found to contain thirteen pigs of various sizes in all, and by these the reptile had been so distended that it was unable to make it's way out through the hole by which it had entered.

While pythons under twenty feet are common enough, the occurrence of a 30ft. snake in the Peninsula seems to me of sufficient interest to be recorded here.

C. Boden Kloss, F. Z. S.

Account of three Snakes.

Coluber oxycephalus. This snake is usually bright green above and of a paler colour below, the tail being yellowish brown as if it were withered : the Dyaks here on that account call this snake the Ular Matiko. A short time ago the Museum received a large specimen over 4 feet long which had no trace of a green colour : dorsally throughout the animal had a uniform brownish colour like that of the tail of a normal form ; ventrally it was pale yellowish. In other respects the specimen conforms precisely to the description of *C. oxycephalus.* In the Museum Catalogue of snakes Mr. R. Shelford my predecessor states that on the sea coast near the mouth of Trusan river he took a brilliant ochreous specimen of this species which was put in formol : after two or three days it turned green but finally the specimen became rotten and had to be thrown away. Possibly his specimen was the same as the variety now described. The colour of my variety however is quite permanent in methylated spirits.

Dipsadomorphus cynodon The British Museum catalogue describes 3 distinct colour varieties of this rather large snake. Our Museum has 19 specimens, of which one from Bau received a year ago and one from Kuching just arrived are of the type described below which does not come directly under any one of the 3 varieties described by Mr. Bonlenger but is not far from his variety B.

Dorsally the general colour is yellowish brown speckled with close-set irregular black dots: there are a number of ill defined black cross bars which are not so wide as the interspaces between them but anteriorly in the first ¼ of its length all there colours are merged together. In the posterior half of the body there is a series of white spots close to the ventrally and anteriorly the colour is yellow with some black spots, posteriorly the 2 colours merge the black predominating. The tail is black with incomplete white rings. These 2 species of snakes were taken near the Astana, Kuching by His Highness the Rajah Muda of Sarawak who kindly presented to the Museum all 3 snakes here mentioned.

JOHN HEWITT.

Note on the life-history of the Cicindelid beetle, *Collyris emarginatus*, Dej.

Within quite recent years a most interesting entomological discovery has been made by Dr. J. C. Koningsberger of the Buitenzorg Zoological Museum, but the facts being hidden in a publication of somewhat limited circulation seem to have escaped the general notice of those interested in the insects of the Far East.

Nearly all the Cicindelidae or tiger-beetles are found in exposed situations, such as sandy banks, roads or even the sea-shore and as a general rule the larvae live in burrows in the soil and feed on insects which they capture when these pass over their burrows. *Collyris emarginata* however is arboreal in its habits, running with great speed over leaves and flowers and readily taking to wing; its larvae live in small burrows excavated in coffee shoots and in these burrows await their prey which consists of ants and aphides. Cicindelid larvae are readily recognised by the swollen anterior end and by the presence of two tubercles armed with small hooks on the dorsal surface of the eights segment; by means of these protubrances the larvae are enabled to wedge themselves up at the top of their burrows awaiting their prey, retiring to the bottom of the burrows once the prey has been seized. The *Collyris* larvae differs in no important particularsfrom the characteristic type, though its habit of living in burrows in wood is sufficiently remarkable. Dr. Koningsberger informs me that he never observed the egg-laying and that he never found any very young larvae, he is unable then to state whether the eggs are laid under bark or on it, and if the young larvae excavates for itself a small burrow which is enlarged as the larva grows in size. Pupation takes place in the burrow. In the Dentchi Entom. Zeitschrift for 1905. p. 172 this Cicindelid is alluded to as herbivorous, but Dr. Koningsberger tells me that this is a mistake, the beetle living on small insects, just like other Cicindelidae. Dr. Koningsberger publishes an all-too brief account of this larva and a poor figure in "Mededeelingen uit 'Slands Plantentuin" XLIV p. 113. fig. 59. (1901). It is much to be hoped that more information will soon be forthcoming about this most interesting form and its allied species. After all it is facts about the life-histories of insects that is wanted now, rather than more dried specimens, and it is a standing reproach to entomologists that so little is known about some quite common tropical insects.

R. SHELFORD.

Nesting of Silk-weaving Ants.

The remarkable habit of the "Karinga" ant (*Oecophylla smaragdina*) in employing its larva as a spinning machine is well known, thanks to the observations of Ridley in Singapore (this journal xxii. 345, (1890-1) and of Holland in Ceylon (Proc. Ent. Soc. London, 1896. p. ix. E.E. Green. On the habits of *Oecophylla smaragdira*). The habit may be mentioned again in order to shew the interest of other observations on another species of ant belonging to a different sub-family. The nest of *Oecophylla smaragdina* is constructed of leaves bound together with a web of silk. If the leaves are torn apart it has been observed that the adult ants immediately repair the breach in the following manner:—several ants hold the separated edges of the leaves together with their jaws, each ant thus acting as an animated clamp; then come other ants every one holding in its mandibles a larva, the mouth of which is applied first to one edge of the leaf and then to the other; as a filament of slightly glutinous silk is being constantly emitted by the larva, a fine silken web is soon woven by the to and fro movements imparted to it by its bearer the worker ant and the breach in the nest is quickly repaired; the "animated clamps" relax their hold as soon as their need is past. Inasmuch as the worker ant is itself incapable of supplying silk, there seems no doubt but that all the silk of the nest is provided by the larvae. The same habit has been recorded for another species of the same genus, viz. *Oe. longinoda* of the Upper Congo and for *Camponotus senex* of Brazil.

In Notes from the Leyden Museum vol. xxv.. 1905. Father E. Wasman records the observations of Herr Edu. Jacobson at Semarang in Java on the ant *Polyrhachis dives.* The nest is constructed between the leaves of a tree alluded to as the Japanese palm; the leaves are bound together by silk and the interior of the nest is lined with silk in which are entangled chips of bark, wood and fragments of dead leaves; the nest in divided into chambers by partitions of semitransparent silk. Jacobson noted that the nest which he had under observation was broken at one point and that the breach was repaired by the same method as that employed by *Oe. smaragdina*, the larvae held in the jaws of the workers being used to spin a silken web across the rent in the nest. A good many species of *Polyrhachis* employ silk in the manufacture of their nests and it would not be surprising to learn that this habit of the workers of employing the larvae as spinning machines is more general than has been hitherto suspected.

R. Shelford.

Malayan Musical Instruments.

In "Fasciculi Malayenses" Pt. II (*a*) Anthropology, of which a notice is given in "Man" 1904, there is a description and figure of a bamboo tuning-fork supposed to be made by the Semangs of the Peninsula. As an identical instrument is described by Dr. A. Schaudenhorst from the Philippine Islands, Mr. W. N. Annandale remarks that "should it prove to be a real Semang instrument and be peculiar to the Malay Peninsula and the Philippines, it would be a most interesting link between the Semangs and the Negritos of these Islands." It may therefore be worth while to record the occurrence of this instrument in Engano, the most southerly Island of the West Sumatran chain. Examples were obtained by Dr. W. L. Abbott in the early part of this year which only differ from the figure in Fasciculi Malayenses in being without ornamentation and more roughly made. They vary in size, my examples being 25 and 30 cms. in length, and are played by being struck upon the thighs.

The Enganese have no Negrite strain and appear to be Proto-Malayans: there are at present only about 500 left and although inter-propagation has now practically ceased they are being slightly hybridised by intercourse with visiting traders principally Chinese.

The "Fascicugi Malayenses" also figures and describes Peninsula *L'nongs* or zithers. I have variants of the types given from Simalur, the most northern of the West Sumatran Islands.

The first is a closed interwove of bamboo, 66 cms. long with five strings raised from the skin and bridged in the usual manner. It is peculiar in having on the reverse side from the strings a long vibrating tongue formed by cutting a broad transverse notch opposite one set of bridges and running a split from either end to the further extremity of the instrument.

The second *g'noug* consists of a closed internode 37 cms. long with only a single string, but having tied to the centre of this an elliptical flat wooden tongue exactly above a rectangular hole cut in the bamboo cylinder. Both instruments are played by means of wooden plectrons.

Though made by the natives of Simalur it is possible that they are of Achinese origin, of which nation there are a number of settlers on the Island, while the Simalurese have only passed out of a wooden and shell stage within the last two or three generations.

C. Boden Kloss, F.S.A., F.A.I.

Chinese Names of Streets.

The following notes, by an old resident, on Mr. Firmstone's valuable list in Journal No. 42 may prove of some interest.

Armenian Street.—Tan Seng Po was, I believe, a brother-in-law of Mr. Seah Liang Leah. His house was the one in Hill-street occupied till recently by St. Mary's College.

Beach Road (VII.)—"Twenty buildings," possibly this refers to the large houses in compounds which formerly fronted the whole of this road between Bras Basah Road and Clyde Terrace, and were in old times occupied by leading European residents.

Selegie Road.—"Tek-kha, foot of the bamboos." I remember when the road from near what is now the entrance to Sophia Road to Mackenzie Road was bordered by luxuriant lofty bamboos—the most beautiful, I think, that I have seen. I mourned when they were removed to make room for houses.

Stamford Road.—The shop ceased to be a "shoe shop" a couple of years ago.

Tanglin.—"No 'little Tanglin.'"—The part of Orchard-road between Tank-road and Grange-road, where there have been shop-houses for very many years, was formerly known as "Tanglin Kĕchil," and may be so still.

Keppel Harbour.—"Jardine's Wharf."—Jardine's and the Borneo Company's Wharves were separate but adjoining the former the nearer to town.

Malacca.—Riverside.— "Foot of the Dutch trees."—The Fort Road, the ascent to the Stadt House, and the road to Tanjong Kling were adorned with magnificent avenues of *angsana* (sometimes called "sena") trees—the same as we have on the Singapore Esplanade. These avenues all decayed in the course of two years—some five-and-twenty years ago, I should say.

A. K.

Journal Nº 46 will be issued shortly.

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